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Supplementary appendix

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Web Appendix 1:

Summary on estimates of prevalence of disadvantaged children with four risk factors in 15 developing countries

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1. Introduction

Our estimation on children's exposure to risks of poor development focused on two risk factors: stunting and extreme poverty. Other risks, such as low maternal education, maternal depression, and violence against children could also create risk for poor development.¹⁻⁴ Children exposed to multiple risk factors are more likely to have poor adult health and wellbeing.⁵ Due to the lack of data on these risk factors in the 141 low- and middle-income countries (LMICs) in 2010 and lack of validations of relationship between existing variables and child development, we were not able to introduce these risk factors into the estimation for the 141 LMICs. We, however, selected 15 countries, which have Multi-Cluster Indicator Surveys (MICS)⁶ in 2010 or 2011, to explore the change of the prevalence of children exposed to stunting or extreme poverty after including maternal schooling and maltreatment in estimation.

2. Methods

Defining four risk factors

In 2006, the World Health Organization (WHO) produced a new growth standard using data from the WHO Multicentre Growth Reference Study (1997–2003).⁷ We adopted the 2006 WHO growth standards to define stunting in the present study: a child was stunted if his/her height-for-age was below minus two standard deviations from the median of the international reference population. In 2008, the World Bank revised the definition of extreme poverty as living below \$1.25 per person per day in 2005 international prices.^{8,9} The present study adopted this definition of extreme poverty. Low maternal schooling was defined as incomplete primary school of a mother. 'Maltreatment' in this study was defined as severe physical punishment.

Data

In October 2014, we collected the data from the countries that conducted MICS in either 2010 or 2011. We selected 15 developing countries based on the following criteria: (1) variables (stunting, wealth index, maternal schooling, and variables related to physical discipline) were available for measuring the four risk factors, (2) the MICS data were nationally representative, and (3) sample size for under-five children exceeded 2,000. The 15 countries included seven low-income countries, six lower-middle income countries, and two upper-middle income countries (see country list and sample size of under-five children in **Table 1**).

Measuring risk factors

Stunting. In the MICS data, there is a variable on an under-five child's height-for-age, which enabled us to construct a dichotomous variable indicating a child's stunting status. **Extreme poverty.** The MICS does not have a variable indicating whether or not an individual lived in extreme poverty (\$1.25 per day). To identify children in MICS with extreme poverty status, we used wealth index variable in the MICS. We first ranked the wealth index score of sampled household members with household weights. We then applied a country's poverty headcount ratio, published by the World Bank,¹⁰ to the ranked wealth scores and located the cut-off point of extreme poverty in the ranked wealth index. All under-five children with wealth score below the cut-off point were considered to be living in extreme poverty. **Low maternal schooling.** The MICS has a variable indicating a mother's schooling. We constructed a dichotomous variable indicating whether or not a mother completed her primary school. **Maltreatment.** There is no uniform measurement about 'maltreatment' for under-five children as a group. We followed the MICS and assessed maltreatment to a child using two variables in the child discipline module on

“severe physical punishment”.: (1) hit or slapped him/her on face, head, or ears in the past month; and (2) beat her/him up with an implement (hit over and over as hard as one could) in the past month. The MICS has these two variables available only for children age 2-14. We were not able to extend approximation to children under two because the assessment of maltreatment for this age group mainly focused on neglect, not physical punishment. We, therefore, could only provide assessment of maltreatment for children age 2-5, which is a limitation of this measure.

Estimating the prevalence of children exposed to the four risk factors

In each survey, by constructing four dichotomous variables that indicate whether a child was exposed to each of the four risk factors, we were able to generate a dichotomous variable indicating whether a child was stunted, or lived in poverty, or with low maternal schooling, or experienced severe physical punishments. Percentage (and 95% CI) of this dichotomous variable is the prevalence of children exposing to the four risk factors, and the estimate does not include children exposed to two or more risk factors. The final prevalence could be decomposed to four components (% of being stunted + % of living in poverty but not stunted + % with low maternal schooling but neither stunted nor in poverty + % with maltreatment but neither stunted, nor in poverty, nor with low maternal schooling).”

We compared the estimates of prevalence of children exposed to two risk factors (stunting or extreme poverty) to that to four risk factors (stunting, or extreme poverty, or low maternal schooling, or maltreatment). To examine disparity in child poor development, we analysed the prevalence of disadvantaged children by gender and residence areas.

Results

1. Change in prevalence

Although there is wide variation across countries, inclusion low maternal schooling and maltreatment in the estimation led to a significant rise of country-level prevalence of children exposed to the risk factors of poor development (**Table 2**). At the aggregate level, 62.7% (95% CI [62%, 63.4%]) of under-five children in the 15 countries were exposed to stunting and poverty, increasing to 75.4% (95% CI [75%, 76%]) with the addition of low maternal schooling and maltreatment.

2. Disparity in percentage of children exposed to stunting, or extreme poverty, or low maternal schooling, or maltreatment

Except in Kazakhstan, under-five children in rural areas had significantly higher percentage of exposure to risk factors than those in urban areas in the 14 countries. We have not observed significant difference in exposing to risk factors between boys and girls in 14 countries (**Figure 1**). In Ghana, boys had a significantly higher percentage than girls of exposing to the risk factors, and this is consistent with the findings about gender difference in stunting in sub-Saharan Africa: boys were more likely to be stunted than girls.¹¹ The finding of no gender-based difference in exposing to the four risk factors was by no means representative for all developing countries, and the national averages can hide important disparities at the sub-national levels (for example, girls in an urban slum of a town in India were found to be more likely to be stunted than boys.¹²).

Table 1: 15 countries and survey information

Country	Region	Income	Survey Year	Child data sample size
Central African Republic	Sub-Saharan Africa	LIC	2010	10,904
Chad	Sub-Saharan Africa	LIC	2010	17,713
Congo, Dem. Rep.	Sub-Saharan Africa	LIC	2010	11,245
Ghana	Sub-Saharan Africa	LIC	2011	7,626
Iraq	Middle east & north Africa	LMIC	2011	36,599
Kazakhstan	Europe & Central Asia	UMIC	2010	5,227
Lao PDR	East Asia & Pacific	LIC	2011	11,258
Mongolia	East Asia & Pacific	LMIC	2010	4,114
Nigeria	Sub-Saharan Africa	LMIC	2011	26,018
Sierra Leone	Sub-Saharan Africa	LIC	2010	8,798
Suriname	Latin America & Caribbean	UMIC	2010	3,462
Swaziland	Sub-Saharan Africa	LMIC	2010	2,711
Togo	Sub-Saharan Africa	LIC	2010	4,908
Tunisia	Middle east & north Africa	LMIC	2011	2,938
Vietnam	East Asia & Pacific	LMIC	2010	3,729

LIC: low income country

LMIC: lower-middle income country

UMIC: upper-middle income country

(Data sources: MICS, <http://www.childinfo.org/mics.html>)

Table 2: Prevalence and the 95% confidence intervals of under-five children exposed to stunting, or poverty, or low maternal schooling, or maltreatment

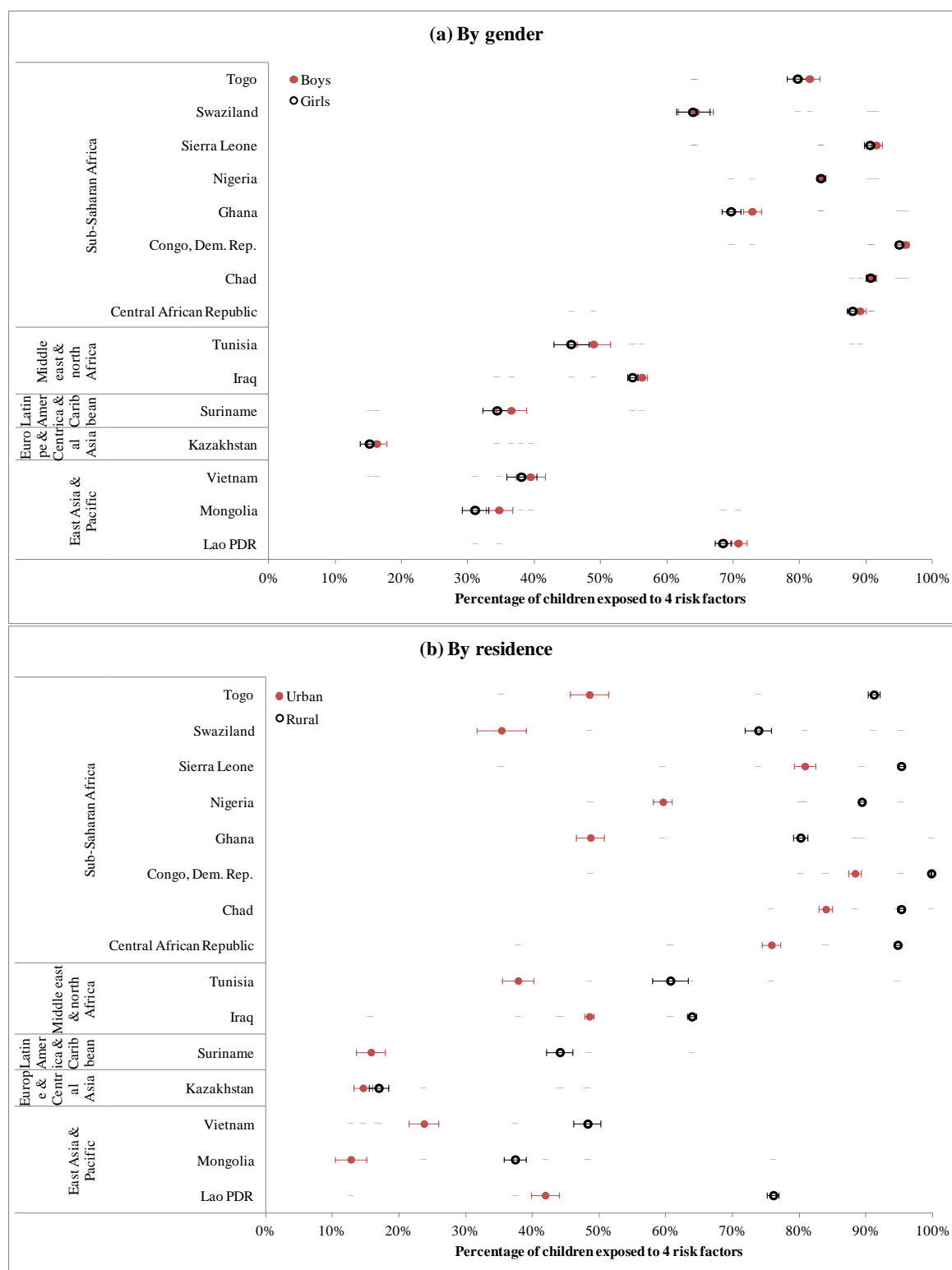
Country	Under-5 Population (thousand)	% of under-5 stunted (95% CI)	% of under-5 in poverty (95% CI)	% of under-5 with low maternal education (95% CI)	% of age 2-5 maltreated (95% CI)	% of under-5 children exposed to 2 risk factors ^a	% of under-5 children exposed to 4 risk factors ^b
Central African Republic	646	37% (36%, 38%)	66% (65%, 67%)	43.5% (42.6%, 44.4%)	32% (31%, 33%)	77.6% (76.8%, 78.4%)	88.6% (88%, 89.2%)
Chad	2291.967	39.5% (38.6%, 40.4%)	37.7% (36.8%, 38.5%)	72.1% (71.3%, 72.9%)	36.7% (35.9%, 37.6%)	61.9% (61.1%, 62.8%)	90.8% (90.3%, 91.3%)
Congo, Dem. Rep.	11180.26	40.3% (39.4%, 41.2%)	91.1% (90.6%, 91.6%)	22.9% (22.1%, 23.6%)	36.5% (35.6%, 37.4%)	92.7% (92.3%, 93.2%)	95.5% (95.1%, 95.95)
Ghana	3592.456	26.3% (25.3%, 27.3%)	30% (28.9%, 31%)	54% (53%, 55%)	15.8% (14.9%, 16.6%)	46.7% (45.65, 47.8%)	71.3% (70.3%, 72.3%)
Iraq	4747.112	20.3% (19.95, 20.7%)	4.4% (4.2%, 4.6%)	24.6% (24.3%, 25.2%)	26.5% (26%, 26.9%)	23.7% (23.2%, 24.1%)	55.6% (55.1%, 56.1%)
Kazakhstan	1570.962	13% (12.5%, 13.9%)	0.02% (0%, 0.05%)	1.7% (1.3%, 2.1%)	1.4% (1.1%, 1.8%)	13% (12%, 14%)	15.7% (14.7%, 16.7%)
Lao PDR	879.093	44.2% (43.3%, 45.2%)	41.7% (40.8%, 42.6%)	34.4% (33.5%, 35.3%)	8.4% (7.9%, 8.9%)	62.4% (61%, 63.3%)	69.6% (68.8%, 70.5%)
Mongolia	280.326	17% (15.8%, 18.2%)	18.6% (17.3%, 19.9%)	6% (5.3%, 6.8%)	2.4% (1.9%, 2.9%)	29.3% (27.9%, 30.7%)	32.9% (31.55, 34.3%)
Nigeria	28848.63	38.6% (38%, 39.2%)	64.5% (63.9%, 65.1%)	48% (47%, 49%)	31.5% (30.9%, 32%)	72.7% (72.2%, 73.3%)	83.3% (82.8%, 83.7%)
Sierra Leone	915.492	40.9% (39.8%, 41.9%)	62.8% (61.85, 63.8%)	73.1% (71.1%, 74%)	16.9% (16.1%, 17.7%)	76% (75.2%, 77%)	91.1% (90.5%, 91.7%)
Suriname	47.639	8.3% (7.3%, 9.2%)	4.9% (4.1%, 5.6%)	21.7% (20.3%, 23.1%)	13.1% (12%, 14.2%)	12.4% (11.3%, 13.5%)	35.5% (33.9%, 37.1%)
Swaziland	164.116	30.8% (29%, 32.5%)	44.8% (42.9%, 46.8%)	11.2% (10%, 12.5%)	11% (9.8%, 12.2%)	58.7% (56.8%, 60.6%)	64.1% (62.3%, 66%)
Togo	1020.492	31.5% (30.2%, 32.8%)	58.3% (56.95%, 59.75)	52.9% (51.6%, 54.4%)	16.9% (15.9%, 18%)	67.4% (66.1%, 68.7%)	80.6% (79.5%, 81.7%)
Tunisia	905.447	10% (9.35, 11.55)	1% (0.7%, 1.4%)	16.8% (15.5%, 18.2%)	32% (30%, 34%)	11% (9.9%, 12.2%)	47.4% (45.6%, 49.2%)
Vietnam	7228.937	22.2% (20.9%, 23.6%)	5.95% (5.2%, 6.7%)	18% (17%, 19%)	3.55 (2.9%, 4%)	25.4% (24%, 26.8%)	38.8% (37.2%, 40.3%)

a: two risk factors: stunting or poverty

b: four risk factors: stunting, or poverty, or low maternal education, or maltreatment

(Data sources: (1) under-five population: United National Population Division: <http://esa.un.org/wpp/Excel-Data/population.htm>; (2) MICS, <http://www.childinfo.org/mics.html>)

Figure 1: Disparity in percentage of children exposed to stunting, or extreme poverty, or low maternal schooling, or maltreatment by gender and residence in the 15 LIMCs



(Data sources: MICS 2010 and 2011, <http://www.childinfo.org/mics.html>)

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Web Appendix 2:
Implementing Care for Child Development:
An inventory of a play and communication intervention to support child development and responsive caregiving

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Summary

Background. The evidence-based intervention, Care for Child Development (CCD), has been shown to strengthen child development and responsive caregiving, even in resource-poor communities. Although the World Health Organization (WHO) and UNICEF introduced CCD more than a decade ago, no inventory existed to identify where and how it has been implemented.

Methods. In December 2014, key informants identified sites where they anticipated that the CCD intervention had been introduced and was likely to be still implemented; 30 forms were sent to sources in those sites. As of June 2015, 17 forms had been completed; each source was followed-up by a phone interview. Project reports provided information for an additional six sites. Finally, evaluation research contributes to an understanding of the potential effectiveness and feasibility of the CCD intervention.

Findings. The process identified 23 implementation sites in 19 countries. CCD has been integrated into a range of existing services for child survival, health, nutrition, infant care, early education, children with developmental disabilities, prevention of violence and child abuse, and a cash transfer programme. Counselling cards and manuals exist in 17 languages. Although in most cases CCD expanded beyond the initial sites, only three countries have taken CCD to national scale. Evaluations found that CCD interventions can improve child development, growth, and health, and responsive caregiving; and can reduce maternal depression.

Interpretation. Maintaining a complete inventory is difficult without institutional ownership. However, the unique implementation process attests to the recognition that CCD has demonstrated its effectiveness, low cost, and feasibility, even with little financial or monitoring support for its implementation. Sufficient evidence and experiences in a range of settings exist to take the CCD intervention to scale.

Funding. US Fund for UNICEF.

Introduction

The WHO and UNICEF evidence-based intervention Care for Child Development (CCD) promotes the effectiveness of primary caregivers in supporting the development of their young children (see **Box**).¹ Research on how to encourage a child's learning of critical developmental tasks through play and communication with a caring, responsive adult influenced the design of CCD. Play and communication activities contribute to a range of developmental tasks: motor skills, sharpened senses, expression of emotions (empathy), sharing, turn taking (harmony), ordering and sequencing, delay of gratification, vocabulary, concentration, flexibility, role taking, and expansion of imagination and creativity.² More recent research on the building of neurological structures and physiological systems—on which all learning is based—clarifies the importance of interactions with a responsive adult in the child's close environment.³ The CCD recommendations on play and communication were introduced in 2002 (Version 1), and greater emphasis on responsive caregiving was added in 2012 (Version 2). The intervention was then adapted for community health workers in order to facilitate its integration into the health sector in 2014 (Version 3). **Table 1** summarizes the three versions.

BOX Care for Child Development

The WHO and UNICEF intervention on *Care for Child Development* (CCD) uses the best available evidence to guide health workers and other counsellors as they help families build stronger relationships with their children and solve problems in providing care at home. CCD is designed for families of children up to 5 years old, but usually focuses on the youngest children from birth to 3 years old. Counsellors ask caregivers how they play and communicate with their children, how they get their children to smile, and how they think their children are learning. The core of the intervention is a set of recommendations on play and communication activities for families to stimulate the motor, cognitive, social, and emotional learning of their children (**Figure 1, page 7**).

The activities also provide a context for adults to learn how to meet the needs of their children—being sensitive and attentive to their cues and responding appropriately to them. Copying a child’s sounds and gestures, one of the recommended activities, builds the child’s interactive communication skills, even before the child can speak. The game also helps the parent look closely at the child, be sensitive to the child’s sounds and movements, and follow—respond to—the child’s lead. These are basic skills that support, for example, breastfeeding on demand, feeding a child who is fussy or sick, and being alert to indications that the child might be ill or in danger. They contribute to the survival and healthy growth of young children, as well as to their psychosocial development. The recommendations are practical. Playing with common household items (e.g. tin cups, empty containers, and cooking pots) can help a child learn; and even a busy caregiver can talk with a child during feeding, bathing, and other routine household tasks.

Providers in a range of delivery settings—health, education, nutrition, child care, emergency, child protection, and other family services—learn the CCD counselling approach through an interactive course combining classroom exercises, videos, and hands-on practice counselling caregivers and their children. The length of the course and follow-up supervision depend on the providers and the delivery settings. The delivery settings also determine the number of counselling sessions the caregiver receives. Within a sick child visit at the health clinic, the counsellor might see the caregiver and child only once. Integrating CCD within home visits, parent groups, child care centres, and nutrition rehabilitation programmes can support longer and more frequent contacts.

Table 1. Three WHO and UNICEF versions of Care for Child Development

Characteristic	Care for Development (Version 1)	Care for Child Development (Version 2)	Caring for the Child's Healthy Growth and Development (Version 3)
Year launched	2002	2012	2014
Content	Counselling the caregiver on play and communication activities to promote child development	Counselling the caregiver on play and communication to <ul style="list-style-type: none"> • Promote child development • Strengthen caregiver sensitivity and responsiveness in interactions with the child 	Integrated counselling on play and communication with counselling to improve child health, growth, and development, including <ul style="list-style-type: none"> • Breastfeeding and complementary feeding • Recognition of signs of illness • Response to illness • Prevention of illness injury
Delivery system	Health with nutrition counselling	Multiple entry points, including health, education, nutrition, day care, child protection, emergency, and cash transfer services	Community health services
Providers	Health workers (doctors, nurses)	Health workers (doctors, nurses), pre-school and day care workers, social workers, community workers	Community health workers
Integration with other services	Newborn care, sick child consultations in clinics	Maternity services, sick child and well-baby clinics, family services for children with disabilities, mother-child groups, parent education, nutrition rehabilitation clinics, home visits for families at risk, social and child protection	Home visiting for newborn and young child health care
Intensity (contacts with family by design)	One consultation plus follow-up	Determined by delivery system	<ul style="list-style-type: none"> • Three visits (child age up to 2 months, age 3 to 4 months, age 4 months) • Up to an additional 4 contacts, based on other prevention or treatment contacts

Inventory methods and limitations

Although WHO and UNICEF introduced CCD more than a decade ago and continued to provide updates, no inventory of its implementation existed. To fill this gap, from December 2014 through June 2015 an inventory was taken to identify where and how CCD has been, and continues to be, implemented. Requests for information on possible CCD implementation sites were sent by email to key informants, including WHO and UNICEF staff, and individuals who had expressed interest in introducing CCD through their work. (Online searches using Google, Google Scholar, and MedlinePlus did not identify additional implementation sites.)

Inventory forms were then sent to 30 persons based on the initial search. Of the potential sites, three had not yet implemented CCD, and there was no response to four requests after two reminders. Between December 2014 and June 2015, 17 completed forms were returned; each was followed-up by a phone interview with the primary source of information. Project reports were reviewed to complete inventories for an additional six sites where the original sources were no longer available. As a result, from the 30 potential inventory records, 23 sites (76.7%) in 19 countries were identified. Inventory responses were organized into an Excel database to record current and future implementation activities.

Several barriers impeded the locating of more sites for the database. Separate implementation arms arise from at least three versions and their adaptations. CCD is integrated within a variety of services. Therefore, the ownership of CCD lies in different implementing organizations, with no centralized reporting system. WHO and UNICEF, the agencies that developed and promote CCD, have been able to provide limited financial support for implementation.

Thus, records do not exist that would usually be required for financial accountability and follow-up. Based on the responses received, groups identified potential benefits and then often independently implemented CCD. Nevertheless, the irregular process of implementation attests to the recognition that CCD has demonstrated its effectiveness, low cost, and feasibility, even where little support for its implementation was available. The inventory is not complete. Since June 2015, the inventory continues to grow, as new sites begin implementing CCD or one report identifies another active site. New efforts to build capacities for implementing CCD, particularly in Africa and Latin America, will produce additional examples to be added to the database.

The introduction and early implementation of CCD

The inventory identified 19 countries, at 23 sites, in which CCD has been introduced. Introduction is defined as the date of the first training to build the capacity of a group to evaluate the appropriateness of the intervention and the feasibility and means of incorporating it into a delivery system that could sustain it. In a few countries CCD was introduced in more than one site by different implementing and funding partners. For example, the Aga Khan Development Network (AKDN) introduced CCD in the Cabo Delgado District in northern Mozambique, and PATH independently introduced CCD in Maputo District in the south. A WHO Intervida project in India introduced CCD in two different areas of the country—Haryana in the north and Maharashtra in the south.

The introduction of CCD to specific delivery contexts in different countries produced a pool of materials adapted from the original CCD package to specific contexts. In Kazakhstan, Care for Development (Version 1) was extensively adapted for nurses and other home health visitors in a better parenting initiative. The Pakistan PEDS project adapted Version 2 for Lady Health Workers to use in 12 monthly group sessions for mothers and their young children and during multiple home visits. In Mozambique, PATH adapted it for children living in areas affected by HIV. Most sites also translate the core set of materials, which are now in at least 17 national or regional languages (Table 2).

Delivery models

The inventory task found CCD integrated within a range of services: child survival and health (Botswana, India, Kazakhstan, Kenya, Kyrgyzstan, Mozambique, Pakistan, and Tajikistan), nutrition rehabilitation (Mali and India), infant care and early education (Kenya and Brazil), services to families with children with developmental disabilities (India and Turkey), and prevention of violence and child abuse (Australia). Different entry points might be used within the same country, as in Brazil, where CCD is included in parenting programs for families of children in early day care centres and services for families participating in a cash transfer programme.

In no example identified in the inventory was a new category of worker created specifically to deliver CCD services. Instead, providers already working with families have been trained to use play and communication activities to promote the child's development and build caregiving skills through the services they already deliver, for example: community health workers (Botswana, India, and Pakistan), social workers and day care workers (Brazil), child protection workers (Australia), and paediatricians and others working with children with disabilities (Turkey). Thus, the CCD approach has been fully integrated into existing services, not as a separate programme, but as a way to strengthen the skills of persons who work with families in different settings.

Table 2. Translation of Care for Child Development (CCD) materials

Language	Job aids and training materials translated		
	Generic CCD Materials ^a	Locally adapted CCD materials	Caring for the Child's Healthy Growth and Development ^b
Armenian		✓	
Chinese (Mandarin)	✓		
Chichewa (Malawi)		✓	
English (original)	✓		✓
French (for West Africa)	✓		
Hindi	✓	✓	✓
Kinyarwanda	✓	✓	
Kiswahili (Zanzibar)	✓ (Counselling Cards)	✓	
Lugandan	✓ (Counselling Cards)	✓	
Mahrati	✓	✓	✓
Portuguese (for Brazil)	✓		
Portuguese (for Mozambique)	✓		
Russian	✓	✓	
Sindh	✓	✓	
Spanish	✓		
Tajiki	✓ (Counselling Cards)		
Turkish	✓		

^a Core job aids and training materials minimally include: Counselling Cards, Participant Manual, and Facilitator Notes, unless otherwise noted.

^b A CCD adaptation for community health workers, which integrates CCD counselling with breastfeeding, complementary feeding, identification and response to illness, and prevention of illness and injury.

The expansion of CCD into new implementing areas and delivery systems

The expansion of an intervention to new areas requires time to review and revise tools and to build the capacity of providers and those in the supervisory systems who support them. Trained persons who have developed skills in one site are able to apply them to new areas. Implementers in PATH, for example, reported that, with initial experience adapting and using the materials in Maputo District, they gained confidence that the intervention was appropriate for providers to learn and use. They were then able to seek the government's support to expand the CCD intervention, starting in another district, and have plans to implement the approach in additional countries.

CCD has been confirmed to have expanded nationally in only three countries. UNICEF introduced Version 1 to the Commonwealth of Independent States (CIS) of the former Soviet Union through regional training in 2003-4. In 2011, Engle evaluated the results through observations and interviews of health providers in three countries—Kazakhstan, Kyrgyzstan, and Tajikistan.⁴ By then, CCD was well-integrated under different names in the training of visiting nurses and clinic doctors. In Kazakhstan, for example, 100% of health workers interviewed reported that they had received training to counsel parents on play and communication activities, although they often did not recognize the name of the generic CCD intervention.

The nation-wide expansion throughout the three CIS countries was facilitated by their highly centralized health systems. With the devolution of more decisions to local and district units in other countries, national expansion is more difficult. However, international agencies can facilitate expansion. The WHO is assisting the Botswana Ministry of Health to offer greater support nationally to families through home visits of their community health workers. The module on Caring for the Child's Healthy Growth and Development, incorporating CCD into health and nutrition services, offers an adaptation specifically for the health sector and may ease the introduction of CCD into other national programmes in Botswana and elsewhere.

Expansion can also mean entry into new delivery systems. The municipality of Petrolina, Brazil, contracted the foundation Instituto Alpha e Beto (IAB) to help them improve family services in approximately 100 pre-school and

day care centres, each serving approximately 80 families of agriculture workers with children from 6 months to 5 years old. Based on the Petrolina experience, IAB staff have begun to introduce CCD in Roraima through the Bolsa Familia cash transfer programme. Trained community social workers visit the homes of approximately 23,000 families who are participating in the programme. This experience with Bolsa Familia could provide a national model to reach more at risk families.

A third type of expansion, yet to be tested, may apply where there is an existing foundation of CCD. For example, in the Wardha District in India, Anganwadi Workers and Accredited Social Health Activists (Ashas) introduced CCD through their community services, which have now expanded to more than 100,000 families. There is interest in adding a compatible assessment tool, the Guide to Monitoring Child Development, to the established CCD counselling services, which can potentially add precision to the selection of recommended play and communication activities for the child with disabilities, as well as identify needs for referral services.⁵

Evidence for the outcomes of Care for Child Development

The early field tests on the CCD intervention focused on the process of delivering the CCD intervention: could health workers learn how to implement the counselling sessions on play and communication, could mothers recall and do the recommended activities at home, and would the added intervention support or distract from the tasks of a sick child consultation.^{6,7}

Since the early introduction of CCD, several studies have looked at the effectiveness, feasibility, and cost of the intervention. In 2007, a study in China looked at children in families who had received counselling from their health providers during two counselling sessions, two months apart. Six months later, these children had higher development quotient scores, compared to children in the control group whose families had not received counselling; and more responsive and consistent caregivers were related to higher child development outcomes. Furthermore, the intervention was found to be understandable and acceptable to the families served.⁸

A case-controlled study in Turkey in 2008 examined the influence on family practices of counselling during a sick child visit by paediatricians before and after they had received training for counselling on CCD. The observed communication skills of paediatricians in assessing and treating sick children, in general, were improved with the CCD training. Home visits one-month later identified improved practices in families who had received CCD counselling, compared to the control group counselled before the CCD training for paediatricians. Improvements included increased time spent reading to children and more toys and other learning opportunities in the home.⁹

A large cluster-randomized study on the effectiveness and feasibility of CCD was conducted over three years (2010-13) in Pakistan through the community services delivered by Lady Health Workers through monthly home visits and mothers' groups.¹⁰ The study found that the CCD interventions increased family time with children in learning activities and language use, positive caregiver-child interactions, and the availability of learning materials in the home; and it reduced harsh punishment. The incidence of childhood illness (diarrhoea, acute respiratory illness, and fever) was lower in the group receiving the interventions on CCD. Some improvement in growth in the enhanced nutrition arm of the study was seen with the addition of CCD. Among participating mothers, the intervention reduced depression,¹¹ which is considered by many to be one of the greatest risk factors for poor growth and health, as well as early childhood development.^{12,13} The study demonstrated that the CD intervention could be implemented on a large scale by existing community health providers, and at relatively low cost compared to other interventions.¹⁴

In summary, the CCD intervention has been found to improve child development outcomes, improve child health, strengthen nutrition and health interventions, and improve caregiver well-being (reduced maternal depression). It is feasible to implement within existing services and at relatively low cost, compared to other health and community interventions.

Discussion

The inventory of the status of the implementation of CCD comes at a time when there have been great advances in the agenda for child survival. Now the need is even greater to support children who survive. Consequently, international agencies are mobilizing resources for programmes in early childhood development.¹⁵ It is recognized also that sufficient evidence exists on the importance of committing resources to strengthen caregiver-child interactions, as a component of any intervention to improve the child's development, as well as the child's health

and growth. Responsive, warm interactions shape neurological structures and physiological mechanisms that affect the child's cognitive and social development. Interventions to improve caregiver responsiveness also contribute to the reduction of childhood disease and, possibly, serve to buffer children from stressful conditions that undermine successful and satisfying lives.

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Figure 1. Care for Child Development:
Recommendations for play and communication activities





RECOMMENDATIONS FOR CARING FOR YOUR CHILD'S DEVELOPMENT

Newborn, birth up to 1 week



Your baby learns from birth.

- **Play:** Provide ways for your baby to see, hear, move arms and legs freely, and touch you. Gently soothe, stroke, and hold your child. Skin to skin is good.
- **Communicate:** Look into baby's eyes, and talk to your baby. When you are breastfeeding is a good time. Even a newborn baby sees your face and hears your voice.

1 week up to 6 months

- **Play:** Provide ways for your child to see, hear, feel, move freely, and touch you. Slowly move colourful things for your child to see and reach for. Sample toys: shaker rattle, ring on a string.
- **Communicate:** Smile and laugh with your child. Talk to your child. Get a conversation going by copying your child's sounds or gestures.

6 months up to 9 months

- **Play:** Give your child clean, safe household things to handle, bang, and drop. Sample toys: containers with lids, metal pot and spoon.
- **Communicate:** Respond to your child's sounds and interests. Call the child's name, and see your child respond.




9 months up to 12 months

- **Play:** Hide a child's favourite toy under a cloth or box. See if the child can find it. Play peek-a-boo.
- **Communicate:** Tell your child the names of things and people. Show your child how to say things with hands, like "bye bye". Sample toy: doll with face.




12 months up to 2 years

- **Play:** Give your child things to stack up, and to put into containers and take out. Sample toys: Nesting and stacking objects, container and clothes clips.
- **Communicate:** Ask your child simple questions. Respond to your child's attempts to talk. Show and talk about nature, pictures, and things.




2 years and older

- **Play:** Help your child count, name, and compare things. Make simple toys for your child. Sample toys: Objects of different colours and shapes to sort, stick or chalk board, puzzle.
- **Communicate:** Encourage your child to talk and answer your child's questions. Teach your child stories, songs, and games. Talk about pictures or books. Sample toy: book with pictures.




Give your child affection and show your love.
Be aware of your child's interests and respond to them.
Praise your child for trying to learn new skills.

Web Appendix 3:

A review of large-scale implementation programmes:

What can we learn for scaling up child development interventions in low- and middle-income countries

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This paper was developed in response to a brief from the World Health Organization in March 2014, to prepare a 3000-word paper that summarizes and analyzes a review of programmes that have promoted early child development at scale. The summary includes a description of key characteristics of each programme (including the goals and objectives, target audience, interventions, delivery approaches), information on coverage and effectiveness, strengths and limitations. The analysis focuses on translational issues of scalability of the approaches in particular in LMICs, feasibility of integration of interventions in existing health service delivery platforms and programmes, human resource requirements for implementation, and opportunities for resource mobilization and investment (considering the post 2015 agenda, NCDs, and the life course approach to Reproductive, Maternal, Newborn, Child and Adolescent Health services).

The paper drew from an initial review by Jayaratne et al¹ and is accompanied by an appendix on programme foundations, implementation and funding.

Introduction

The scale of the problem of poor early child growth and development is enormous. Some 200 million children under the age of 5 years in low and middle income countries (LMICs) are estimated to have sub-optimal early growth and development as a result of exposure to poverty. Poor growth and development threatens the ability of young children to:

- Resist life-threatening illness, abuse and neglect;
- Learn from parents, other caregivers and their own experience;
- Benefit from the education that is available to them;
- Work for better earnings;
- Get on well with other people and enjoy mutually rewarding relationships;
- Enjoy good health and longevity in adulthood, and
- Give their own children a better start in life.²⁻⁷

The risks associated with poor growth and development are more likely to be realised in low-income environments. The main reason for this is that, in poverty environments biological and social risks are likely to co-occur.⁸ Thus children are prone to experience multiple rather than individual risks. Also, in poverty there is less likelihood that children will be exposed to factors that promote good health and development and that enable them to compensate for early disadvantages.⁹ Lastly, the social and biological risks associated with poverty tend to persist across the lifespan of individuals born in poor communities, increasing further the likelihood of compromised health and human capital beginning in early childhood.

Engle et al reviewed the evidence for the effectiveness of programmes and strategies to address poor early childhood growth and development in LMICs, as have others.¹⁰⁻¹¹ Using selection criteria for effectiveness trials and programme evaluation, Engle et al identified 20 early child development programmes, 18 of which reported substantial improvements in early child development.¹² In the later paper (2011), 11 of 15 parenting interventions showed positive effects, 4 of which were scaled up programmes (Uzbekistan, the Gambia, Ecuador, central Asia) in which promotion of child development was incorporated into pre-existing health and nutrition programmes or services (including IMCI Care for Child Development). Positive effects were also reported in 8 out of 9 preschool programme evaluations.

Nores and Barnett conducted a meta-analysis of 56 quasi-experimental or randomised studies (including 30 interventions and 38 contrasts) in 23 countries in Europe, Asia, Africa, and Central and South America. Average effect sizes were found to be positive and moderate (0.26-0.39) on all four broad domains assessed (health, behaviour, cognition and education).¹¹ There were overall lower effects in LMICs as compared to high-income countries, and the positive effects seen tended to concentrate in the health domain.

As indicated by research from high-income countries, these three reviews show that quality and duration are critical to producing benefits. There are too few studies to determine the durability of benefits over the medium- and long-term outcome. However, early interventions are not vaccines against poverty and poor quality schooling; rather they are one component in a multifaceted set of public investments in human development and complementarity across domains and time is important to achieving sustained benefits.

Although there is always a need for more and better studies, lack of evidence for the benefits of early interventions to improve the growth, health and development of young children in LMICs should not be the major barrier to large-scale, although communication of this information might play a role.

Unfortunately, despite encouraging evidence of their effectiveness, only a handful of LMICs have launched large-scale programmes with some level of government commitment. And there are no examples of small-scale projects or pilot programmes (either parenting or preschool programmes) expanding to the scale needed to reach the estimated 40-60 percent of children in LMICs estimated to be growing up in poverty, many of whom are inadequately nourished, under-stimulated, and exposed both to harsh punishment in the home and to hazardous environmental conditions.

National or state-wide programmes to support young children and their families

In contrast, several high-income countries have introduced universal (and targeted in some cases) programmes to prevent young children and families from experiencing difficulties and to help them overcome those they do face, and which directed to reach disadvantaged children. These programmes are led by government, with financial commitment, that aim from the start to be large scale and sustainable. This paper provides a brief overview of such programmes with a view to deriving guidelines for similarly large scale and sustainable programmes in LMICs.

The paper has its origins in a comprehensive review of eleven of what are called major Child Health Partnerships (CHPs) in four comparable high-income countries: the United States of America, the United Kingdom, Canada and Australia, by Jayaratne et al.¹ The review was filled out with very brief overviews of the programmes attached as an Appendix.

CHPs are defined as “comprehensive organizational frameworks made up of two or more local partnering agencies working towards a common objective of ensuring the physical and social development of young children” (p. 2). The partnerships are seen as a novel approach to addressing the social determinants of children’s health, with related benefits for both child wellbeing and parenting. The focus of the Jayaratne et al review is on the success and impact of partnerships *per se*, addressing such questions as: Was the partnership formation successful? How did the partnerships contribute to service? Was there positive early childhood development in major domains? Were there improvements in parents and/or families? The review used standard search procedures, and the inclusion and exclusion criteria are shown in Table 1.¹

Table 1: Inclusion and exclusion criteria

<p><i>Inclusion criteria</i></p> <ol style="list-style-type: none"> 1. Systematic programmes launched at the national or state/county level 2. Involved more than two stakeholders in partnership building or service integration 3. Partnerships based at local areas 4. Sustained for at least three years 5. Operated in the past two decades (1989-2009) <p><i>Exclusion criteria</i></p> <ol style="list-style-type: none"> 1. Programmes aimed at improving parameters other than early childhood outcomes 2. Programmes focused entirely on one particular parameter of early childhood development

The 10 identified programmes^a are shown in Table 2. All the programmes rely on various combinations of partnerships between various levels of government and civil society organizations working in the fields of health, social welfare and education. The programmes differentially target all children, disadvantaged children or disadvantaged areas. Programmes consist of varying service components, depending mainly on differently negotiated local needs.

Table 2: Brief descriptions of the 11 national or state/county programmes to improve early childhood development (see also Appendix 2 Additional File 1: Characteristics of Programmes and Appendix 4 Programme Foundations, Implementation and Funding)

Start date	Country, State	Name	Target groups
1994	USA	<i>Early Head Start</i>	Low income pregnant women and families with infants and toddlers
1998	California, USA	<i>First 5 California</i>	All children prenatal to 5 years of age, and their parents, relatives, and primary caregivers
1998	New South Wales, Australia	<i>Families First</i>	All children, families and communities
1999	United Kingdom	<i>Sure Start Local</i>	Area-based disadvantaged pregnant women and families with children under 4 years of age
2000	Manitoba, Canada	<i>Healthy Child Manitoba</i>	All children
2000	Australia	<i>Stronger Families and Communities</i>	All children
2002	Victoria, Australia	<i>Best Start</i>	Disadvantaged children, families and communities from pregnancy to 8 years of age
2002	Toronto, Canada	<i>Toronto First Duty</i>	All children
2003	South Australia	<i>Every Chance for Every child</i>	All children 0-8 years of age
2005	United Kingdom	<i>Sure Start Centres</i>	All children and families, from conception to 14 years (16 years if a child has special needs)
2008	Victoria, Australia	<i>Every Chance for Every Child</i>	Vulnerable children, young people and families

Listed below are some key common features of these programmes regarding, for example, programme foundations, implementation and funding:

Foundational features:

- While evidence is amassed and cited as important to the motivation for the initiatives, programmes appear to originate principally in political concerns about the welfare of children; social inequality; the perpetuation of poverty; the social exclusion of indigenous people, immigrants, minorities, and other groups at risk of marginalization, and/or the need to improve educational and human capital outcomes and to contain social deviance.
- The vision in all 10 programmes is of a comprehensive approach to children and families and the integration of existing services at the desired level of quality. The approach is described as “whole-of-government” or “joined-up-thinking” to the whole child.
- Most programmes are founded formally, by a statute or a formally communicated government strategy or commitment. For example, the 1981 Head Start Act or the California Children and Families Act of 1998
- Programmes fall under and are the responsibility of a senior lead government department or agency, working in collaboration with other departments as well as civil society organizations. Accountability for implementation is also clearly delineated. For example, the *Healthy Child Manitoba* programme was established by statute and is overseen by a Cabinet Committee consisting of the Ministers of the lead departments. The Cabinet Committee is replicated at the level of Deputy-Ministers and Inter-Departmental Committees. The Task Force for South

^a 11 are listed in the Jayaratne et al paper, but *Sure Start Local* and *Sure Start Centres* are part of the same strategy of the UK government.

Australia's *Every Chance for Every Child* is chaired by the state premier and includes the Ministers of the four lead government departments.

- All programmes have been subjected to debates about social priorities and public expenditure, contestable evaluation findings and budget cuts. None are perfect and all have evolved over time. Their outcome effects on children and families over the longer term are not yet what the programmes hope to achieve. Nonetheless, several have continued for two to three decades and have sufficient support among the electorate and child and family advocates to make it highly likely that they will be sustained and improved.

Implementation features:

- Considerable communication and effort is put into creating a sense of participation, ownership, investment and responsibility by parents, families, communities, and other stakeholders. For example, Early Head Start sites get evaluated positively for parent volunteering.
- Most programmes are tendered out (outsourced or franchised) for implementation to local partnerships or consortia with a lead coordinating agency (non-governmental or government).
- The lead agency receives funding from a mix of sources – national, state or provincial and local government, and philanthropic organizations – and transfers funds on to implementing partners as negotiated under tenders.
- Programmes are constructed on the basis of need assessments and local consultations between parents, families, available services and agencies serving children and families, and volunteer groups.
- Though responsive to local needs and demands, services are required to conform to founding principles and to meet standards set by government.
- Implementing agencies are evaluated on a funding cycle (4-5 years) according to explicit assessment criteria. Evaluations include partnerships, and capacity development (individual, agency and community), as well as child, parent and family outcomes. Implementing agencies re-compete for funding after each cycle and poorly performing services are not re-funded.

Service features:

- While the national programme offers a strategic approach, a framework for services and their quality, as well as evaluation criteria, the precise nature and form of services are determined locally by representative structures, including parents and families to be served by the programme.
- Despite the fact that there is no common programme model, all programmes include some form of mass communication, parenting support, financial assistance, health, nutrition, child care, and preschool preparation.
- Not all services are provided by one agency, organization or government department, but every effort is made through a local committee or other structure on which parents and community groups are represented, to ensure seamless access to a comprehensive range of services for children and families.
- Children and families living with disabilities, young parents, families living in low socio-economic class conditions or areas, immigrants, and indigenous people are generally targeted for services, including by outreach strategies.
- Parent and family involvement is a central feature of all programmes.
- Programmes tend to offer both universal preventive services to strengthen parenting and early childhood development, as well as targeted intervention services for vulnerable and at-risk children and families.
- Universal preventive services include:

- Mass communication ranging from web-site resources and television to pamphlet drops, parent meetings and health fairs. These strategies focus on a range of locally determined priorities, including the importance of parents and families in the lives of children, the detrimental impact of harsh physical punishment and positive alternatives to socialising children, breastfeeding promotion, nutrition, the importance of physical activity, safety education and injury prevention.
- Health services such as antenatal and postnatal care, immunization, smoking cessation etc
- Child care and preschool opportunities for 3- to 5-year-old children
- Drop-in activities and advice facilities and resources for children and families
- Targeted services for vulnerable groups include:
 - Home visitation by volunteers, child care workers and/or family health nurses
 - Parent training
 - Income support of various kinds
 - Links to training and employment initiatives
 - Referrals to specialised services
- Most programmes comprise a mix of home and community (or outreach), centre and combinations of home and centre-based services.
 - Health, nutrition and early learning services are variously offered at home, in community groups and in centres
 - Parenting support is provided through home visits, child care, and parenting programmes
 - Financial assistance takes the form of child benefits and other social security payments, emergency cash, tax credits, assistance to enrol in health insurance, and provision for basic needs such as food, clothing and housing. Many programmes are two-generational, with direct services for children and families and additional services for parental training and employment.
- Few programmes provided new services. While there was some expansion of services, in the main, existing services are integrated into “one-stop shops” or networks of services.

Evaluation:

Several of the programmes have been rigorously evaluated, both in terms of partnership formation and service delivery, as well as child and parenting outcomes (6 programmes evaluated the latter). Four programmes have had economic evaluations. Examples of evaluations are (see also Appendix 3: Additional file 2: Evaluation designs and outcomes)

- Randomised control trials – *Early Head Start* (USA)
- Quasi-experimental studies – *Sure Start Local Programmes* (UK), *Sure Start Centres* (UK), *Toronto First Duty* (Canada), *Best Start* (Australia)
- Longitudinal follow-up – *Stronger Families and Communities* (Australia)
- Various kinds of process evaluations – *Families First* (Australia).

Partnerships were generally found to be effective (in five out of seven programmes evaluated) with improved service cooperation and coordination. Health-led partnerships were found to be most effective in *Sure Start*. Four programmes demonstrated that more families, and more disadvantaged families, were reached, with positive service uptake and flow-on effects. Most evaluated partnerships were found to be cost-effective, but only one programme (*Stronger Families and Communities*, Australia) reported a sustainable partnership even after funding ceased.

Three of the five programmes rigorously evaluated (*Sure Start – Children’s Centres*, *Early Head Start* and *Toronto First Duty*) reported a variety of improvements in children’s assessed cognitive, social-emotional and language development; these three programmes and *Stronger Families and Communities* found improved parenting outcomes. Older programmes achieved better outcomes than more recent ones, suggesting that improvements occur over time.

A thorough analysis of the evaluations of these 10 programmes is beyond the scope of this paper, as the publications comprise a substantial and complex literature on their own.

Translational issues

In order to learn from experience gained in long-standing, large scale programmes in high-income countries to improve parenting and early child development, we need to distil what are the essential lessons, build on what is available in LMICs countries, and take advantage of emerging national, regional and international opportunities.

Proceed from what we know

The three national and seven state-wide programmes reviewed are ambitious in scope, detailed in execution and continuously subject to public scrutiny. Importantly, hold Jayaratne et al, “many of the programmes in fact were based on existing services that did not require large increases in funding. This suggests that they may also be suitable in resource-poor settings”.¹

Anything less ambitious than these illustrative large-scale programmes for disadvantaged children will not have the desired public health and welfare benefits in LMICs. Country-wide coverage is required, as are comprehensive and integrated services, and for the efforts to be sustained. Complementarity is important to young children’s growth and development. Parent programmes delivered to families in destitution without income support, opportunities to learn in the absence of good nutrition, poor quality preschool experience, and so on, have diluted and less durable impacts.

The alternative to this large-scale, centrally-led approach is the continuation of the current trend of expensive donor-funded, non-sustainable short-term project-based activities with limited coverage, targeting single types of child problems, such as early learning, nutrition and growth, the effects of HIV and AIDS, disability, education, and the impact of violence and other emergencies.

Many of the lessons to be learnt from large-scale programmes in high-income countries are known and have been recommended for LMICs; for example, Engle et al list the following among the features of successful programmes they identified:¹⁰

- Government must lead.
- Make explicit who is responsible for implementation and hold them accountable.
- Start services during pregnancy and continue until school age.
- Target disadvantaged children.
- Integrate health, nutrition, education, social and economic development.
- Create partnerships between government agencies and civil society.
- Ensure the buy-in and active involvement of parents and families.
- Ensure sufficient quality, intensity and duration to achieve positive outcomes for children and families.

Build from what we have

National capacity

Children are precious resources in most low- and middle-income countries. They embody the past and provide continuity and security into the future. Many LMICs have made child-friendly commitments through international charters and national policies. Many have legal provisions to protect children from harmful practices, provide basic services for children and families, and allocate budgets and create ministries responsible for expenditure and execution. All of these efforts must be improved and expanded, as must coverage and quality for children and families to be better served.¹¹

Most LMICs provide services for young children and families in isolation from one another – health, education, social welfare, housing, environment and safety, and so on. Importantly, most have national budgets for these sectors that are dwarfed by donor funds. In turn, donor funds directed to children and families tend to be allocated to single-focus project activities. Few LMICs have accountable, coordinating mechanisms at the centre or the periphery, or empowered citizens, including parents, who can and do demand better conditions, facilities and services for their children

The challenge is **how** to achieve comprehensive and integrated approaches and **what** services to prioritise in programmes. Global leadership is needed to assist governments to:

- Rally donor, government and civil society (including faith organizations) resources (financial, human and knowledge)

- Under a single high-level government body
- In service of comprehensive national strategies for integrated support for young children and their families
- That are delivered at the local level in collaboration with parents, families and existing agencies and volunteer groups
- Who are held accountable to clear standards and targets
- And funded through the fiscus in collaboration with donors, the private sector and civil society.

Programme development

Health services are the logical centre from which to build integrated programmes for young children and their families. Key elements of comprehensive programmes listed earlier need to be built progressively onto health services in a planned way in response to local need assessments, existing resources and emerging opportunities. These are nutrition and early learning, parenting support, child care and financial assistance.

A few of these elements are already evident in some LMICS – cash transfer programmes are expanding in Africa,¹³ and IMCI's Care for Child Development provides a platform for expanding support for nutrition, parenting and early learning. Child care for the youngest children, especially for working or otherwise challenged parents and caregivers, is a glaring need.¹⁴

However, several features of programmes in high-income countries that have proved to be essential need to be developed or rapidly expanded in LMICs. These include:

- Mass communication (through meetings, health fairs, faith-based activities, materials, radio and TV) to promote parenting, nutrition, injury prevention, family literacy and positive socialisation methods instead of harsh punishment.
- The involvement, active engagement, volunteering and support of the parents, families and communities served.

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APPENDIX: Programme foundation, resourcing and implementation

Early Head Start - USA

(<http://eclkc.ohs.acf.hhs.gov/hslc/hs>)

Head Start, and later Early Head Start, emanated from the sentiments of the War on Poverty expressed in Lyndon B Johnson's 1964 State of the Nation address. A panel of experts was assembled to develop a comprehensive child development programme that would help communities meet the needs of disadvantaged preschool children. The approach was influenced by new research on the effects of poverty on education and the obligation to help disadvantaged groups to compensate for inequalities in their early social or economic conditions. The programme was designed to help break the cycle of poverty, providing preschool children of low-income families with a comprehensive programme to help meet their emotional, social, health, nutritional and psychological needs. A key tenet of the programme is that it be culturally responsive to the communities served, and that the communities served have an investment in its success through the contribution of volunteer hours and other donations as a non-federal share.

In 1994 Early Head Start (EHS) grew out of Head Start as a two-generation programme to provide services for preschool children and their families. It is federally funded through the 1981 Head Start Act. (<http://eclkc.ohs.acf.hhs.gov/hslc/standards/Head%20Start%20Acteach>). The programme is administered from the Office of Human Services (OHS) under the Secretary of State, through the Early Childhood Learning and Knowledge Center, an Office of the Administration for Children and Families. Head Start submits regular reports to Congress. Within 8 years of starting, by 2002, EHS was serving 55 000 children in 664 communities.

EHS operates as a quasi-franchise in that eligible agencies apply for financial assistance for a period of five years to conduct, administer and evaluate a programme focused on low-income children, targeted as locally agreed, and that meets the basic tenets of the programme. That is, the programme provides (1) such comprehensive health, education, parental involvement, nutritional, social, and other services as will enable children to attain their full potential and attain school readiness; and (2) provides for direct participation of parents in the development, conduct, and overall programme direction at the local level". Agencies compete for re-funding in each cycle and poorly performing programmes are not re-funded. The Early Head Start National Resource Center provides information and guidance documents to EHS organizations and the public <http://eclkc.ohs.acf.hhs.gov/hslc/ta-system/ehsnrc>.

Head Start has served some 30 million children since 1965 and is currently a full-day and full-year programme. While positive effects have been reported with respect to child development, socio-emotional adjustment and school performance, as well as family functioning, considerable political controversy dogs the cost and durability of the effects of the programme.

Selected readings:

Deming D. Early childhood intervention and life-cycle skill development: evidence from Head Start. *Am Econ J Appl Econ* 2009; **1**: 111–134.

US Department of Health and Human Services. Early Head Start impact study: final report. Washington DC, 2010.

Sure Start (Programmes then Centres) – UK

(<http://webarchive.nationalarchives.gov.uk/20091211230137/dcsf.gov.uk/everychildmatters/earlyyears/surestart/whatsurestartdoes/>)

Sure Start (SS) was initiated in 1998 by the Labour Government as part of its Comprehensive Spending Review, including also Wales, Scotland and Northern Ireland. It is similar in some ways to Head Start USA and Head Start Australia. SS was launched to be large scale (£540m allocated from 1999-2002 to reach 150 000 children) and to target geographic areas of disadvantage. It exemplifies “joined up government” and “joined up thinking”

The foundational principles were “to give every child the best possible start in life”, by improving child care, early learning, health and family support, especially through outreach activities and community development. Initially, and for about 10 years, SS was centrally funded, but then responsibility was transferred to local authorities with the intention of establishing a SS centre in every community (3 500 centres by 2010). SS falls under the Department for Children, Schools and Families, but every each SS project is allowed to develop in its own way, depending on the choices of parents and the guidance of the organizations running SS projects. In response to the tapering off of government funding, some SS projects and centres have been registered as charities and as public-private enterprises. However parents have taken objections to further funding cuts directly to government.

SS Centres are expected to provide:

- In most disadvantaged areas: integrated early learning and childcare for a minimum of 10 hours a day, five days a week, 48 weeks a year; and support for a childminder network
- In less disadvantaged areas: drop-in activity sessions for children
- Support and advice on parenting, information about services available in the area and access to specialist services
- Health services, such as antenatal and postnatal support, information and guidance on breastfeeding, health and nutrition, smoking cessation support, speech and language therapy and other specialist support
- Links with a training and employment initiative (Jobcentre Plus) to encourage and support parents and caregivers who want training and employment
- Quick and easy access to wider services

Several evaluations of SS have been conducted. In 2010, a rigorous evaluation of 5-year-olds found the following:

- For children: Lower Body Mass Index (BMI) and better health than comparison children
- For mothers: Provision of a more stimulating and more home environment, using less harsh discipline, and experiencing greater life satisfaction
- Over time, from when children were 3 to 5 years of age, there was more improvement in the home environment, a greater decrease in harsh punishment, a greater decrease in workless households and a more positive change in life satisfaction.

Selected readings:

The National Evaluation of Sure Start (NESS) Team, Institute for the Study of Children, Families and Social Issues, Birkbeck University of London. The impact of Sure Start local programmes on five year olds and their families, Research Report DFE-RR067. London: NESS, 2010. Available: <http://www.ness.bbk.ac.uk/impact/documents/RR067.pdf>

Glass N. Sure Start: The development of an early intervention programme for young children in the United Kingdom. *Child Soc* 1999; **13**: 257–264.

Roberts H. What is Sure Start? *Arch Dis Child* 2000; **82**:435–437.

Belsky J, Melhuish E, Barnes J, Leyland A, Romaniuk H. Effects of Sure Start local programmes on children and families: early findings from a quasi-experimental, cross sectional study. *BMJ* 2006; **332**: 1476.

Healthy Child Manitoba – Canada

<http://www.gov.mb.ca/healthychild>

Healthy Child Manitoba (HCM) was established in 2000 under a special Cabinet Committee with the goal of helping all children and youth reach their potential with the help of their families and communities. The Committee includes the Ministers of Family Services and Housing; Health and Healthy Living; Justice; Aboriginal and Northern Affairs; Labour and Immigration; Status of Women; Education, Citizenship and Youth; and Culture, Heritage, Tourism and Sport. The HCM Cabinet structure is replicated at the level of a Deputy Ministers' Committee and Inter-Departmental Committees. HCM was recognized as a national strategy under The Health Child Manitoba Act of 2007.

The initiative is guided by evidence which suggests that holistic accessible, integrated services, involving partnerships with parents, children, youth and communities work best for children, particularly 1) multi-year early intervention for families, prenatal to 6 years, including home visiting and nutrition programmes and 2) high quality child care and preschool experiences. Guiding principles are: community based, inclusive, comprehensive, integrated, accessible, with quality assurance and public accountability. Local agencies are contracted to provide services according to government standards for services and with ongoing evaluation.

Parent Child Coalitions (PCC) are established in all regions of Manitoba to promote and support local community-based programmes for young children and their families. The programmes of each PCC are determined through needs assessments and community consultations. Early child development programmes include:

- Healthy Baby – a monthly prenatal financial benefit to help low-income pregnant women buy nutritious foods; community (outreach) programmes support women and their families during pregnancy and the first year of parenthood
- Families First – Public health nurses visit all families prenatally or at birth to discuss service needs. Families with children under 5 can receive weekly home visits for up to 3 years
- Foetal Alcohol Syndrome Strategy – includes public awareness and information as well as mentoring for three years for women who use drugs and alcohol heavily during pregnancy
- Triple P Positive Parenting Programme – parents are offered support
- Early childhood health promotion – supports maternal health, prenatal, newborn and early childhood health services, with an emphasis on prenatal and infant nutrition, promotion of physical activity and injury prevention
- Child care – oversees the operation of licensed child care facilities to provide high quality child care from 3 months to 12 years of age, including for children with special needs
- Children's programmes – services for families of children with special needs
- Early Child Development Initiative (ECDI) – assists schools to provide preschool services such as family literacy, child development and health information for parents, and resources for children and families to prepare them for successful school entry
- National child benefit – income assistance

Selected Readings:

Healthy Child Manitoba Vision. Investing in early childhood development. Progress Report to Manitobans. 2005. Available: http://www.gov.mb.ca/healthychild/ecd/ecd_2005_progress_report.pdf.

Chartier M. Early Childhood Development in Manitoba: From Research to Policy Development. The Manitoba Education Research Network: Winnipeg, 2009. Available: <http://www.mern.ca/f16-papers/ECD.pdf>.

Best Start Victoria – Australia

<http://www.education.vic.gov.au/ecsmanagement/beststart/default.htm>

Best Start (BS) is a whole of government early years initiative under the auspices of the Department of Education and Early Childhood Development that aims to improve the health, development, learning and wellbeing of all Victorian children from pregnancy through to their transition to formal schooling. The cornerstone of the BS approach is local partnerships, including with Aboriginal communities, between all tiers of government, representatives of local parents, providers of services for young children and their families, and other groups who are involved in and can impact on the day-to-day lives of young children and their families.

BS local projects are funded through a variety of budget streams, including municipalities, rural/small town project funding, Aboriginal project funding and funding for other initiatives.

Best Start aims to strengthen the capacity of parents, families and communities and early years services to better provide for the needs of all young children. It is based on:

- Making innovative changes to services based on evidence
- Coordinating and integrating existing services
- Mobilising community interest, resources and infrastructure, and creating child-friendly communities
- Ensuring services are inclusive of culturally diverse children and families
- Reaching out to minorities and vulnerable children and families
- Consulting with parents about their knowledge and expectations

Projects are typically based on the following strategies:

- Promoting service co-operation – 1) among staff - joint professional development activity, establishing hubs (children's centres, multiservice facilities), service linkages across the early childhood sector, and 2) among parents - development of service directories, locality-based network groups
- Health promotion/social marketing - use of health promotion and social marketing strategies to promote services, such as involvement in community festivals and mounting theme-based 'expos'
- New service infrastructure – 1) universal - playgroups and parents groups (for training in reading to children, nutrition etc), 2) for at risk groups - family resource centres in primary schools offering professional consultations; outreach services (eg lactation consultants), alternative antenatal services for teenage mothers; training volunteers to provide support services to at risk parents.

Selected readings:

Dunt B, Raban B, Nolan A, Semple C, Kelaher M, Feldman P. Statewide evaluation of best start final report.

Melbourne: University of Melbourne, 2006. Available:

http://www.eduweb.vic.gov.au/edulibrary/public/beststart/2007/bs_eval_report_Sept2006.pdf.

Victoria Department of Human Services. Aboriginal Best Start Status Report, 2005. Available:

http://www.eduweb.vic.gov.au/edulibrary/public/beststart/aboriginal_best_start_reprt-3.pdf.

Toronto First Duty – Canada

<http://www.toronto.ca/firstduty>

Toronto First Duty (TFD) began in 2001 as a demonstration project to test service integration across early childhood programmes: public health, child care, kindergarten and family support in school-based hubs. The goal was to develop a universally accessible service model that promotes the healthy development of children from conception through primary school, while at the same time facilitating parents' work or study and offering them support to their parenting roles.

The original project partners are the Atkinson Charitable Foundation, the Toronto District School Board and the City of Toronto Children's Services, with the goal of mobilizing knowledge to improve early childhood programmes and policy at both the local and provincial levels.

TFD is a model of how existing early childhood development services can be transformed into one user-friendly programme. It also respects the primary role of parents and promotes learning opportunities at home.

TFD sites and programmes have five key elements:

- Integrated governance – partners pool their resources to plan and deliver the programme. For example, a school may supply the physical space and the basic educational and administrative staff; the Early Learning Centre supports the Centre Manager and early childhood education staff; the Toronto School District Board contributes professional development and covers time for the staff to attend; the Foundation for Student Success supports the nutrition programme; Toronto Public Health delivers pre- and post-natal services, additional parenting programmes, identification and referrals. The Ontario Institute for Studies in Education provides research and evaluation; a charitable foundation and the City of Toronto provide funding for capital start-up, transition and operating cost; the School District Board funds the half-day programme for children 3.8-5 years.
- Seamless access – families access all services through a single enrolment process. Participation is flexible.
- Integrated early learning environment – the school's classrooms are also licensed under the Day Nurseries Act, providing for multi-use of space.
- Staff teams – a team of early childhood educators, kindergarten teachers, parenting staff and educational assistance deliver the programme using a common curriculum, resources and space.
- Parent participation – the involvement of parents is regarded as paramount to children's success. Parents are welcome to take part in the centre's activities at any time; this includes eating lunch or snacks with their children, joining in the classroom activities, or participating in adult-only classes.

Selected readings

Corter C, Janmohamed Z, Pelletier J. Toronto first duty Phase III report. Toronto, ON: Atkinson Centre for Society and Child Development, OISE/University of Toronto, 2012. Available:

http://www.toronto.ca/firstduty/tfd_phase3report.pdf.

First 5 California - USA

<http://www.cafc.ca.gov/>

The California Children and Families Act of 1998 (also known as Proposition 10) created a state-wide programme (in all 58 counties) to support, promote and improve the early development of children from prenatal to age 5 years. The explicit goal of Proposition 10 is to “enhance the health and early growth experiences of children, enabling them to be more successful in school and to give them a better opportunity to succeed in life” (<http://www.f5ac.org>). It specifically provides for a comprehensive and integrated system of services to support children and their families, and to educate parents and caregivers about the important role they play in their children’s first years. The Act also created the California Children and Families Commissions to administer, with county commissions the implementation of the programme. Since that time First 5 California (F5C) has evolved and is continually being improved through ongoing evaluations.

F5C comprises four categories of funding: programmes that are 100% state funded, the school readiness programme that is jointly funded by the state and counties, programmes that are 100% funded by the country, and other programmes that are jointly state and county funded. In 2011 the California Children and Families Trust Fund was created in the State Treasury, consisting of money collected through tobacco taxes to implement the F5C. Specific allocations under this code include, for example, 6 percent to mass media communications, and 3 percent for research and development. While state funding is under pressure, the federal health care reform law requires states to maintain children’s coverage through the Children’s Health Insurance Programme (CHIP, or Health Families in California) and Medicaid (Medi-Cal in California) and to keep these programmes stable.

F5C is franchised or outsourced at the local level to agencies who develop services in collaboration with local partners and parents of a quality that meets state-led standards. To illustrate how programmes are adapted to local needs, the nutrition and exercise component of the school readiness programme focuses on healthy food choices, physical activity and limiting children’s use of TV, video games and computers. Child care is also an important feature, given that 62% of Californian children under 5 spend at least part of their day in the care of someone other than their parents.

F5C’s school readiness programme has four goals:

- Improve family functioning (meeting basic family needs, general parenting classes and intensive parent support, and behavioural and mental health services)
- Improve child development (family literacy programmes, preschool for 3- and 4-year-olds, early education provider programmes, and comprehensive screening and assessment)
- Improve health (tobacco cessation, breastfeeding promotion, nutrition and fitness, health access, home visitation for newborns, oral health, prenatal care, primary health care, safety education and injury prevention, and specialised medical services)
- Improve systems of care (the readiness of schools for children, provider capacity development and support, outreach, community strengthening)

An evaluation framework is in place to meet the reporting and evaluation needs of the state and county commissions. The primary stakeholder-driven questions addressed are: Who and how many children and families are being served? How much is being spent? On what? Who is providing services? Is First 5 efficient? What results are being achieved?

Selected readings:

Government Finance Officers Association, Altmayer Consulting, Inc. Report to the First 5 California state commission. Statewide Evaluation Framework. Final Report. The First 5 Evaluation Framework Workgroup: California, USA, 2005. Available: http://www.first5sacramento.net/Media-Room/Documents/sac_007499.pdf .

Families First - New South Wales, Australia

<http://www.familiesfirst.nsw.gov.au>

Families First (FF) was introduced by the government of New South Wales in 1999 in response to mounting international evidence demonstrating that universal prevention and targeted early intervention programmes have a range of benefits for families and, over the longer term, saving tax payers the cost of more expensive treatment, compensation and rehabilitation programmes. FF is administered by the Department of Community Services (DoCS) in collaboration with the Departments of Agency, Disability and Home Care, Education and Training, Health and Housing, and Area Health Services. The explicit goal of FF is to “help parents and carers give their children a good start in life, to help them connect with each other for support and to prevent problems before families find themselves in crisis. FF has been explicitly designed for parents who are expecting a baby, families with children who have a disability, and families from ethnic communities including Aboriginals.

The NSW government allocates funding through the implementing departments for integrated services. After a consultative local planning process, expressions of interest are invited from community organizations to provide FF services.

Services are provided in partnership with local government and community organizations and parents according to common principles. Partnerships span programme design, planning and delivery. Services include family workers, volunteer home visiting, playgroups, schools as community centres and other locally developed community programmes. DoCS also runs a Parenting Campaign, to support parents in raising their children by providing parents with easy-to-read practical information (<http://www.parenting.nsw.gov.au>).

Selected reading:

University of New South Wales Research Consortium. Families First Outcomes Evaluation for the Cabinet Office of New South Wales. New South Wales: SPRC, UNSW, 2002. Available:

https://www.sprc.unsw.edu.au/media/SPRCFile/Report7_02_Families_First_OutcomesEvaluationFramework.pdf.

Social Policy Research Centre, University of New South Wales. The evaluation of brighter futures, NSW Community Services Early Intervention Program. SPRC Report 13/10. New South Wales: SPRC, UNSW, 2010

Available: https://www.sprc.unsw.edu.au/media/SPRCFile/2010_13_SPRC_Report.pdf.

Every Chance for Every Child – South Australia^a

<http://www.everychild.sa.gov.au/>

Every Chance for Every Child (ECEC) is one of seven strategic priorities of the government of South Australia, along with Creating a Vibrant City, Safe Communities and Healthy Neighbourhoods, An Affordable Place to Live, Growing Advanced Manufacturing, Realising the Benefits of the Mining Boom for All and Premium Food and Wine from our Clean Environment.

The lead agency is the Department for Education and Child Development and ECEC is led by the Minister. The programme is based on research which indicates that the greatest determinant of a child's future health, development and happiness is their experience in their first five years of life, and it aims to find better ways of supporting and strengthening South Australian families and children to achieve their best. ECEC is an integrated and comprehensive programme based on partnerships between parents, carers, health workers, non-governmental service providers, business and industry, teachers – “and even children themselves”.

A Task Force was set up in 2012 to provide coordination and leadership in four key areas:

- Children are born healthy
- Confident and engaged parents and families
- Healthy child development and wellbeing
- Quality early learning

The Task Force is chaired by the Premier of South Australia and includes the Minister for Education and Child Development, the Minister for Health and Ageing, the Minister for State/Local Government Relations and the Minister for Communities and Social Inclusion.

Selected readings:

National Evaluation Consortium: Social Policy Research Centre at the University of New South Wales, Australian Institute of Family Studies. National evaluation (2004–2008) of the Stronger Families and Communities Strategy 2004–2009. Occasional Paper No. 24. Australia: Department of Families, Housing, Community Services, and Indigenous Affairs, Government of Australia, 2009. Available: <https://www.dss.gov.au/sites/default/files/documents/op24.pdf>.

^a *Every Chance for Every Child Victoria* has not been reviewed separately

Stronger Families and Communities

<http://www.fahcsia.gov.au>

The Stronger Families and Communities Strategy (SFCS) established new partnerships to strengthen families and communities, including families, local organizations, volunteers, business, communities and all levels of government. Budget is allocated to 1) strengthen families in three priority areas (early childhood and the needs of families with young children, strengthening marriage and family relationships, and balancing work and family) and strengthen communities to find local solutions to local problems, develop community leadership, promote best practice and support volunteers to develop skills. The strategy also includes a robust evaluation framework with key performance indicators, including a longitudinal study of Australian children.

Priorities are set locally and funds are allocated to coordinate services across health, education and other sectors. Projects focus on prevention and early intervention with particular emphasis on early childhood and parenting, building on existing infrastructure and partnerships. The strategy includes a National Communication Campaign “to reinforce the significance of good parenting and strong family relationships to our children’s lives, our communities and Australia’s future. All projects supported by the Stronger Families Fund are evaluated.

Communities for Children, which is funded under the SFCS, is an initiative for place-based programme management and service delivery for children up to 5 years and their families. It links service providers under a lead non-governmental agency that oversees broad community consultation to identify local needs, resources and government structures to deliver whole-of-community services to improve outcomes for children and families. A committee of local representatives is the key decision-maker, developing and overseeing the implementation of a four-year strategic plan and manage the disbursement of funds to deliver the services identified. Representatives from the business, academic, research and community sectors provide high-level oversight. They identify emerging gaps in service delivery and improvements to be made in the future.

Some of the challenges identified through evaluations include:

- While NGOs are experienced in service delivery, they have less capacity as enablers, brokers and networkers and frequently have less experience in managing a programme the size of Communities for Children, covering a broad range of early childhood interventions. This is managed by ensuring that NGOs go through a competitive tendering process that requires them to address a range of criteria.
- Problem solving has to be managed to ensure that projects function as intended. This includes identifying potential risks in strategic plans as well as contingency funding to respond to unintended problems or developing needs in the community.
- Avoiding duplication of existing services by carefully mapping services in the strategic plan. Community Services Ministers at the state and national level have agreed to collaborate on a national approach to the provision of children’s services.
- Funding is provided to NGOs, not only to deliver services, but also to build community cohesion, linking diverse groups, and building individual and community capital.

Selected readings:

Royal Melbourne Institute of Technology. Stronger Families and Communities Strategy Evaluation 2000-2004. Internal Report to FaCS. Melbourne: RMIT, 2004.

Web Appendix 4:

Case studies of four scaled-up early child development programmes in middle-income countries

Chile Crece Contigo

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Vision and goals

Chile Crece Contigo (ChCC) was conceived as a comprehensive childhood protection system. Its mission is to protect children and their families through universal and targeted benefits. The main goal of ChCC is to enable all children to reach their full development potential. ChCC's design is based on a rights and gender equity approach and on the scientific evidence regarding the importance of the first years of life, including gestation, for comprehensive human development. ChCC includes actions aiming at preventing children and their families from being exposed to adverse conditions that can have negative consequences in children's development. Importantly, ChCC implementation is managed at the local level and since its inception it has relied heavily on existing institutions and infrastructure.

History

In 2005 a series of pre-investment studies were made, which aimed to identify and systematize national diverse experiences relevant to child development including parenting standards of indigenous peoples, and interventions with pregnant teenagers, among others. In 2006, during her first term, President Michelle Bachelet created the Advisory Council for the Reform of Child Policies, whose mission was to advise the President in identifying and formulating plans, programs and other requirements aimed at establishing a national child protection system. The Council developed a diagnosis of the situation and shortcomings in the protection of this segment of the population, and proposed a series of actions for the implementation of a comprehensive protection system for children named ChCC.

ChCC was first implemented in 2007 in 159 municipalities and in the following year it was expanded in the remaining 186 municipalities of the country. In September of 2009, Law 20,379 was enacted, institutionalizing ChCC and providing a permanent line budget item for it in the federal budget.

Structure and governance

The agency responsible for coordinating ChCC is the Ministry of Social Development, which coordinates with other Ministries, mainly Education and Health, ChCC benefits and implementation quality standards. The Ministry of Social Development is represented locally through the Regional Secretaries of Social Development (SEREMIS). Therefore, the coordination is both horizontal (across ministries and services of the same region), and vertically (across different levels of government).

ChCC operates fully with public support that includes monetary transfers to different public and private entities. Indeed, since the creation of ChCC, a special budget line in the Budget Law of the Chilean public sector was established for the Ministry of Social Development. The Ministry of Social Development is therefore assigned the resources according to that budget line and then they allocate resources to the ministries from health and education through resource transfer agreements. These ministries then generate and implement the offer of services in the ChCC portfolio. Given the unique management model of ChCC, the Ministry of Social Development can also sign transfer agreements with local governments, i.e. municipalities, to support the local management and implementation of the programme with vital activities such as hiring and training personnel, and providing supplies for the services included in the program. The institutions that receive funds are required to report the monthly expenditures and use of technical resources defined within the framework of the agreements signed. These agreements commit coverage and implementation standards and any funds that are not spent by the implementing institutions must be returned to the State.

Implementation

ChCC is an integrated network of interventions and social services supporting the child and his/her family since gestation and until 4 years of age. The Biopsychosocial Development Support Programme is at the core of ChCC

and includes health check-ups during pregnancy, health care during labor and delivery, health checks of children, screening and timely treatment of developmental delays, and care for hospitalized children. Treatment of children with developmental delays may be provided through stimulation rooms, home visits, and playgroups, among others. Regarding education, ChCC ensures that every child younger than 2 years old living in a vulnerable family with risk factors such as teen mother, maternal post-partum depression, substance abuse, lack of family support, and/or low levels of schooling has access to quality infant/toddler care for parents/caregivers employed, looking for work or attending school and that children between 2 and 3 years have access to preschool. ChCC also has a radio show and offers through the web high quality information and education materials to assist families and providers with implementation of age-appropriate strategies to improve early child development (www.crececontigo.gob.cl).

The local government should ensure that every family entering the system, belonging to the group defined as vulnerable, are given preferential access to other social protection programs including home visits as well as education and training opportunities.

ChCC reaches approximately 80% of the target population taking advantage that the point of entry into the are the prenatal care services from the universal and effective public health care system that the country has. During the first semester of 2015 ChCC served 97,947 pregnant women and 668,308 children from birth to age 4.

Monitoring and evaluation

ChCC includes a monitoring and evaluation system designed to: 1) provide short and long-term information useful for programme implementation management and oversight; 2) monitor nutrition and child development outcomes; 3) establish whether observed improvements in child development outcomes can be attributed to ChCC, and 4) analyze the functioning of ChCC from a systems perspective.

The short-term impact of ChCC is currently being assessed through a series of quasi-experimental studies designed to test the effects of the Biopsychosocial Development Support Program during gestation and the children's' first year of life.

Key child development indicators monitored by the ChCC management and evaluation system are: exclusive breastfeeding rates, skin-to-skin contact for 30 minutes or more after birth, psychomotor development, screening for risk of developmental delays, actual developmental delays, number of children diagnosed, treated and referred for risk of developmental delays and developmental delays, and biopsychosocial risks in pregnant women (such as teen mom, maternal post-partum depression, substance abuse, lack of family support, low levels of schooling), among others.

Lessons learned for scaling up

ChCC is considered to be a model programme as reflected in the fact that its conceptual framework and design is being replicated across countries in Latin America and beyond. The launching of ChCC benefited greatly from the global and local evidence on the impact of integrated early child development interventions as well as pre-investment studies conducted in the context of a social consensus and of very strong political support. ChCC has been rapidly and successfully scaled up facilitated by strong political support at the highest level, the backing of a national law together with a budget line item in the federal budget and its foundation upon existing structures across the health, education and social development sectors. ChCC accomplishments can be explained through a complex adaptive systems lens. ChCC is the result of strong interdependence among sectors from the national to the local level and was built with strong input from decades of experience in Chile delivering evidence-informed health and social protection programs at the local level. ChCC has had to overcome negative feedback loops including the changes in Chile's political leadership soon after it was deployed. ChCC was able to reach very high coverage in a short period of time and sustain it thereafter as it utilizes the well established public health care system as the point of entry into the program. The programme has also been successfully scaled up because it has allowed for adaptation of curriculums and delivery methods to the needs of local communities or municipalities including those where indigenous communities live. ChCC has a computerized management and evaluation system in place that communicates across sectors and government levels and is able to track prospectively the services offered and outcomes of children and families.

The long term sustainability of ChCC will require refining and standardizing its routine operational procedures to ensure a homogenous high quality of programme delivery across municipalities. Key elements for longer term

sustainability of ChCC include operational management improvements especially at the municipal level, where ChCC community networks work; further investments in workforce development and retention, streamlining of multi-level implementation and monitoring processes, from the national to the municipal, and strengthening the implementation of quality standards for ChCC components that do not yet have them. It's also important to strengthen multi-level and intersectorial management & evaluation systems and to strengthen civic engagement as well as the participation of the justice, labor, and housing sectors in the system. Also, the implementation of ChCC has been characterized by dissimilar participation from the main sectors involved in ECD: education, health, and social protection. The education sector has been somewhat less involved in comparison to the other two sectors.

To further its impacts ChCC must adapt the programme priorities to “emerging” problems such as the maternal-child obesity epidemic. ChCC has now identified as a priority the need to expand its strategy and services to children until they are 9 years of age. This will require identifying the development needs of children in this age group and set the objectives, infrastructure and the technical support needed to achieve this goal.

In sum, ChCC is an early child development (ECD) evidence-informed intersectorial system that was launched and scaled up nationally relatively recently. Due to its success it is already being emulated by other countries, providing a unique opportunity to understand emergence and at-scale implementation of a national ECD programme as well as its spread beyond Chile.

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A detailed description of the activities conforming the Chile Crece Contigo program can be found at: <http://www.crececontigo.gob.cl/biblioteca/materiales-para-equipos-de-trabajo-y-ejecutores/equipos-de-salud/>.

Findings from evaluation studies of Chile Crece Contigo can be found at <http://www.crececontigo.gob.cl/biblioteca/estudios/>.

Integrated Child Development Services

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Vision and goals

India's Integrated Child Development Services (ICDS), a national initiative, supports the early development of children below 6 years. It offers a basket of six services related to nutrition, health, early stimulation and community education through village-based *Anganwadi* (AW).¹ Started in 1975, as a pilot, the ICDS currently runs 1.4 million centres across the country. The ICDS aims to (i) improve children's nutritional and health status; (ii) ensure a sound foundation for their psychological, physical and social development; (iii) reduce incidence of mortality, morbidity, malnutrition and diminished learning capacity through enhancing caregivers' capability regarding children's health and nutritional needs; and (iv) achieve effective inter-departmental co-ordination of policy and implementation. Restructured in 2013-14 as a National Mission, the ICDS is now prioritizing the needs of children below 3 years, converting AWs into vibrant ECD centres, strengthening early childhood education, improving infrastructure and promoting flexibility in design and implementation.

History

The ICDS was launched in 1975 after the National Policy on Children (1974) raised concerns about the survival and development of young children. Inspired by the early success of the Head Start Programme (launched in 1965) in the USA, the ICDS was designed as a centrally sponsored scheme within a federal structure to be implemented through the States. Initiated in 33 administrative blocks of villages in 1975, the ICDS currently has 1.4 million AW centres across the country. They reach the most vulnerable segments of societies with all six services linked to health, nutrition and early learning. The ICDS was restructured and upgraded into a mission mode in 2013 and provided a budget of 1.23 trillion rupees (over US\$ 20 billion) for the current Five Year Plan (2012-2017) period. Some focal areas include children below three years, strengthening Early Childhood Education, improving infrastructure, promoting flexibility and decentralisation.

The Ministry of Women and Child Development (MWCD) in the Government of India has the nodal administrative responsibility for ICDS,¹ and the Minister presides over the National ICDS Mission Steering Group. This Ministry, initially a part of the Ministry of Human Resource Development, received independent status in 2006, possibly due to significant international attention on the high levels of malnutrition among children below 5 years in India and related pressure from social activists and civil society.

Structure and governance

The ICDS is by design a cross-sectoral programme. While the nodal responsibility is with the MWCD and its constituents, three of its six services, namely Immunisation, Health Check-up and Referral Services are delivered through the Public Health Infrastructure under the Ministry of Health & Family Welfare. Departments of Education in different States often also provide support for Early Childhood Care and Education curriculum development and training. Programme implementation at the field level involves interface between communities and local governance systems related to primary healthcare, education, water and sanitation.

Overall responsibility for ICDS implementation at the State level is with the Department of Women and Child Development. At the district level it is overseen by the District Collector who facilitates convergence with other sectors, under direct supervision of a District Programme Officer. At the field level, ICDS operates through projects at the level of Community Development Blocks. Each project includes over 100 AWs which are overseen by a team including a Child Development Project Officer and about five supervisors. Each AW is managed by an Anganwadi worker and a helper. From the health sector Medical officers, an Auxiliary Nurse Midwife and an Accredited Social Health Activist form a team with the ICDS functionaries to achieve convergence of different services.

Prior to 2005-06, 100 percent of funding for inputs other than supplementary nutrition was provided by the Central government. This pattern is now modified to a Central Government: State ratio of 90:10 to gradually enhance state responsibility.¹ As several States were not able to meet the nutrition costs, the federal government agreed in to meet 50 percent of the costs or expenditure incurred on nutrition by States in 2005-06. From 2009-10, this funding pattern

has been further modified for north eastern States to accommodate their specific needs, with the federal government meeting 90 percent of their nutrition costs as well.

Implementation

The ICDS targets all children below 6 years from economically disadvantaged backgrounds across the country, particularly those from rural and tribal communities. As it follows a life-cycle approach, the programme also targets adolescent girls, pregnant women and lactating mothers and their children.

At the AW, children below 6 years receive supplementary nutrition, immunization, health checks and preschool education. The Anganwadi worker collects information on births of children and monitors growth in children's weight. Nutrition is also made available to pregnant and lactating women and adolescent girls. Special counselling and nutrition are also provided to moderately and severely malnourished children. Anganwadi workers also organise mothers' meetings and make home visits to provide health and nutrition education.

ICDS is the world's largest community-based programme to promote early child development. In 2014, the ICDS scheme served 104.5 million beneficiaries. This included 84.9 million children under six years (46.7 million children between birth and three years of age and 38.2 million children between three and six years of age) and 19.6 million pregnant and lactating women. The number of beneficiaries of the programme has increased markedly in the past 15 years. In 2002 about 14 million children under 3 years received supplementary nutrition and the number rose to over 46 million in 2014. Further, while over 16 million received the preschool education component of the ICDS in 2002, the number rose to over 37 million in 2014.

Nationally, 72 percent of the sample enumeration areas in the NFHS-3 were found to be covered by an AWC and 62 percent were covered by an AWC that had, by the time of the survey, existed for at least five years.²

Monitoring & evaluation

Anganwadi workers provide monthly and quarterly reports to Supervisors. Supervisors submit reports to Child Development Project Officers who, in turn send reports to the State government/Union Territory. The latter are copied to the Central Monitoring Unit that monitors and evaluates the ICDS for the MWCD.³ Reports are also received from the Ministry of Health and Family Welfare with data on immunisation and health monitoring. The primary emphasis of the reporting is on the input side.

The ICDS is a well-conceived but inadequately implemented scheme. It has been argued that (i) too much emphasis has been placed on increasing the supply of AW centres and not enough on their use and the quality of services; (ii) not enough thought was given to the scale of resources needed to run an effective scheme to provide a high quality intervention to over 100 million children; and (iii) the AW centres lack physical, learning and human resources to meet their goals. All these factors have adversely affected the quality of implementation and there are wide variations in ICDS functioning and quality across and within states.⁴⁻⁸

A recent Rapid Survey of Children across the States (2013-14) presents disaggregated data by wealth quartile to indicate the extent of targeting and impact of the programme. The results provide a mixed picture, with differences between States. Some very positive outcomes are that 43.7 percent of women surveyed from the lowest wealth quartile had received more than three antenatal care visits; on the other hand full antenatal care has been utilised by only 9.5 percent women in that quartile. More than half (50.6%) of children between 12 to 23 months were found to be fully immunized and 70 percent of children below 6 months had received exclusive breastfeeding. However, 50.7 percent of children are still stunted and almost 35 percent did not attend any preschool programme. Overall the awareness of ICDS services among beneficiaries was very high at 86 percent but largely for the food component.

Studies have also examined the impact of the ICDS by examining the three National Family Health surveys. These studies have linked the presence of an ICDS centre to lower levels of malnutrition. Data from the most recent National Family Health Survey 2005-6,² show that rural children from 0- to 2 years receiving supplementary nutrition daily were 1 cm taller than their same gender peers in rural India.⁹ A seminal, longitudinal study of the short- and long-term impact of early childhood education on child development is currently underway in three states. Initial findings indicate that (i) there are State variations in quality of AW centres; (ii) preschool education is a weak component of AW centres and private preschools with children graduating with low levels of school readiness;¹⁰ and (iii) The quality of the preschool education at the AW centre was positively associated with children's school

readiness.¹¹ Further, school readiness levels at age 5 were significantly associated with learning levels at ages 6 and 7.¹²

Lessons learned for scaling up

The foremost challenge for ICDS is India's scale, with a population of 158 million children below 6 years, as well as its wide diversity. In the effort to reach the masses, quality has been difficult to maintain. A second challenge is the lack of political will reflected in inadequate financial allocations. Although ICDS did receive a significant budget increase in the last few years of the prior government, the recent budget by the new government has imposed a severe cut in allocations, reflecting even lower priority to the social sector. A related challenge is the lack of institutional capacity across the system for planning, management, implementation and monitoring. This is related to under-spending of even the given resources, thus creating a vicious cycle of low spending, low allocations and poor human development indicators.¹³ A fourth limitation is the low level of ownership of ICDS by States, since ICDS is seen as a central initiative, resulting in significant dependence on central guidelines, thus weakening the agency of the States. This is reflected in large number of vacancies in the system and in many cases nutrition supplementation being the only service visible to the community. Corruption in food procurement and distribution and in the appointment of *Anganwadi* workers in some States contributes further to this perception.¹⁴ Effecting a change in community perception will be a major challenge. A fifth challenge is that the "multi-component comprehensive, integrated model is harder to implement than a stand-alone intervention".¹⁵ Convergence with other sectors in a vertical system is very complex; added to that is the dependence on a single multi-purpose worker who is expected to be not only the sole service provider but also to be multi-skilled.

Central sponsorship is both a challenge and a facilitator since it ensures all states implement the programme. The NGOs sector and external funding have facilitated advocacy and accountability and supported quality improvement initiatives. International commitments have also served as catalysts, particularly since one-sixth of the world's children are in India. The Indian policy framework for children has been relatively comprehensive and updated and that has been an enabling factor.

The major factor in sustainability is State funding and priority. The ICDS funding pattern has itself been designed from this perspective with Central-State ratios gradually changing towards greater State responsibility, thus providing scaffolding to States. The enhanced devolution of funds to States in the recent budget has also provided some impetus at the State level towards greater responsibility and contextualisation. Persisting high levels of malnutrition in India continue to provide the rationale to continue and expand the ICDS services as reflected in its upgrade into a Mission.

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South Africa's Preschool Year (Grade R or Reception Year)

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Vision and goals

Democratic South Africa's first formal vision for Early Child Development (ECD) is articulated in the 2001 Department of Education White Paper 5 on Early Childhood Education: Meeting the Challenge of Early Child Development in South Africa. South African children start formal schooling in Grade 1, by law in the year in which they turn 7 years of age; and schooling is compulsory until the last day of the school year in which they turn 15.¹ No-fee schools were introduced in 2007 by legislation and, by 2013 these comprised 80% of all public schools. Reception Year, Grade R, is the year before formal school, and children enter in the year in which they turn 5. The Grade R programme is fully government-supported, it is designed to be universally available, and it is in the process of becoming compulsory.

The Department of Education committed itself to a national preschool year, and by 2010 to have 85% of all children to attend Grade R at a public school; further, to provide a sliding subsidy to benefit children attending schools in the 40% poorest areas of the country. This vision has been refined in subsequent documents and accompanied by a series of activities, reviews and commitments that have accelerated from 2011 onwards, culminating most recently in the January 2014 Election Manifesto of the African National Congress (ANC), the ruling party of South Africa.²

History

ECD came onto the agenda of the Apartheid government with the publication of the De Lange Commission report in 1981,³ which cited environmental deprivation as the main reason why (principally White) children were not ready for school and the Commission recommended some form of pre-primary education. This took the form of a bridging programme, launched in 1988.⁴

ECD was a focus of the National Education Policy Investigation (NEPI) that investigated policy options for the United Democratic Front (UDF), the anti-Apartheid movement launched in the early 1990s. It produced an Early Childhood Educare Report (1992) in which a range of options for ECD were discussed, including a pre-primary class for all 5-year-olds. This was taken up in the 1994 African National Congress (ANC) Policy Framework⁵ as a reception year for 5-year-olds and commitment to child care and development in the community for younger children.⁶ A World Bank-funded study was commissioned in the same year to provide recommendations to support the implementation of the Reception Year.⁷

Since 1994, ECD has been recognized as part of the transformation of South African society. In 1995, a senior staff post was created for ECD and Junior Primary in the national Department of Education. The 1995 White Paper on Education and Training committed government to 10 years of free and compulsory schooling for every child, starting with a reception year. In 1996, an Interim Policy for Early Childhood Development was launched and in 1998 the Department of Education created a separate ECD Directorate, responsible for developing an ECD policy framework and planning large-scale provision of ECD and mobilizing resources for it.

Historical accounts of ECD portray the political climate of the liberation struggle as providing an enabling environment for the development and expansion of ECD services. Rights and restitution were at the forefront of the political struggle. The National Committee on the Rights of the Child was formed in 1990 and South Africa ratified the Convention of the Rights of the Child in 1996 and the African Charter on the Rights and Welfare of the Child in 2000. This was done through creating a coherent vision through policy and building grassroots support for it. Roy Padayachie was a major figure behind the ECD movement. He was a microbiologist and active in liberation politics. In the 1980s he established an early learning centre in the community in which he lived and pioneered the playbus concept to provide mobile facilities to the poorest communities. He remained a strong advocate of ECD and went on to be the Deputy Minister of Communications and the Minister of Public Service and Administration.

Running up to the new democratic South Africa, NGOs were very influential in providing ECD services, in policy development, and in efforts to scale up services.

Structure and governance

The vision for Early Child Development (ECD) programmes in South Africa is of an inter-sectoral responsibility, shared among the Departments of Social Development, Basic Education (DBE) and Health. In practice though, the Reception Year, is the responsibility of the DBE at the national and provincial levels.

Since 2003/2004, funding for Grade R has been provided by Treasury through the Department of Education with provincial allocations designed to provide equally for all learners. Government spending on pre-primary education has increased more than spending on any other area of education, but still lags behind spending for Grades 1-3 (see Figure labeled 4 below). In 2005, funding for Grade R was seven times less than for a Grade 1 learner, but funding has been increasing steadily towards the goal of making Grade R universal and compulsory by 2014/2015. Provincial departments allocate money in two ways: A) to public primary schools, and school governing bodies employ teachers and materials and B) a per-learner grant is provided to community-based ECD sites that are registered to provide a Grade R programme.

Implementation

Grade R is provided by the State and the majority of children attend Grade R in a public school. About 15% of children attend Grade R in a private (independent) school or in a community ECD centre and, because it is not compulsory, a very small proportion of children do not attend any Grade R class. Enrolment in Grade R doubled in 8 years and, in 2012, 767 865 of all 1 017 316 5-year-olds in South Africa (75.4%) were attending a Grade R class.⁸ Most children are in the public school system. An estimated 15% of all Grade R learners attend a community site, and a very small number of children attend an independent school. The goal is to expand Grade R to 810 000 (80%) by 2014.

Accredited Grade R educators have to be registered with the South African Council of Educators, and all training for educators who do not have a specialized qualification to teach Grade R has to be approved by the Department of Education and other accreditation bodies.⁸ Grade R curriculum forms part of the Foundation Phase (Grade R to 3), with a focus on literacy, numeracy and life skills.⁹

Monitoring & evaluation

The Department of Education monitors the achievement of targets, mainly through the Education Management Information System (EMIS), from Grade R classes at primary schools and at community sites. Several evaluations have identified the lack of qualified teachers, and lack of quality learning and teaching materials.⁹ To improve quality, the Department of Education is developing support materials, including posters and booklets with practical ideas. To address the lack of qualified teachers and quality materials, the Department of Education is holding off the introduction of a Pre-Grade R recommended by the National Planning Commission so that it can attend first to quality improvement in Grade R.¹⁰

In 2013, van der Berg et al analyzed data from the nationally representative General Household Survey (GHS) and found that children who attended Grade R had better writing skills than children who did not.¹¹ Grade R had a benefit between 6 and 25% of a year's learning, averaged over all Grades from 1 to 6. An analysis of SES of schools indicate a substantially larger benefit in both mathematics and language test score in wealthier schools.¹¹ In most cases there was no significant effect on test performance in lower quintile schools and, as suggested in the SACMEQ III analysis, the introduction of Grade R actually widened the performance gap between schools.¹¹

Lessons learned for scaling up

Grade R has the features of a Complex Adaptive System (CAS) that emerged and has been brought up to scale through a series of positive and negative feedback loops.¹² Grade R is solidly based on a national funded legislation, resulting from strong political will to address the legacy of Apartheid, that requires the programme to be implemented at the provincial level under the central leadership of the Ministry of Education. Grade R has been able to achieve large coverage as a result of the strategic decision to implement it predominantly through the existing public school system infrastructure. This, however, has created strong challenges in ensuring programme quality as Grade R relies on a relatively weak infrastructure of the overall school system. Its interdependence on the public school system also makes it difficult to ascertain that resources allocated to Grade R are used in the programme

instead of other components of the school system. Grade R continues to have strong political support and there are no indications that it will be discontinued. However, longer term sustainability of Grade R will require quality improvements and the programme will have to adapt to a rapidly changing ECD environment in South Africa, especially for children from birth to three years of age. The NGO sector that was crucial for the emergence of Grade R is no longer playing a key role in the operations of the program. NGOs are ideally suited to assist the government with the training of Grade R teachers in early childhood education. Creating a cadre of strongly qualified Grade R teachers has strong budgetary implications as salaries would need to increase. Currently it's unclear where those additional resources would be coming from.

In conclusion, the emergence and scale up of Grade R's coverage is a major success towards improving ECD opportunities for all in South Africa. It is particularly noteworthy that Grade R represents a huge milestone in ECD education, as it is the first time that a sub-Saharan Africa country has successfully legislated and implemented universal preprimary school education. The two key challenges ahead are to address the major quality improvements needed and integrate Grade R with other ECD strategies to ensure its longer term sustainability. This will require for Grade R to have a much stronger intersectoral governance structure as it currently operates only from the Department of Basic Education.

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Shishu Bikash Kendras (Child Development Centres) in Bangladesh

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Vision and goals

The long-term vision of Bangladesh's *Shishu Bikash Kendra* (SBK, Child Development Centre in Bengali) programme is to ensure optimum development for all children born within Bangladesh through a tiered system of screening, assessment, diagnosis, support and appropriate referral.

The present goal is to provide children with evidence-based, comprehensive neurodevelopmental assessment, treatment and guidelines for long-term management by a multidisciplinary team of professionals comprised of a child health physician, a child psychologist and a developmental therapist within selected secondary and all tertiary government hospitals of Bangladesh.

History

The first multidisciplinary SBK was established in 1992 by Dr. Naila Khan and colleagues in the Department of Pediatric Neuroscience, Bangladesh Institute of Child Health, Dhaka Shishu (Children's) Hospital (DSH), a private non-profit hospital catering to low and middle income families. Technical assistance was provided by the Neurosciences Unit, Great Ormond Street Hospital, London, through resources for evidence-based research, training workshops, placements and visits from various agencies including the UK Department for International Development (DFID), and the British Council. Research was conducted at DSH from 1992 onward to inform the development of evidence-based practices and services. Data revealed that with increasing child survival, declining fertility rates and rising parental literacy, increasing numbers of families were seeking services early for their children's developmental problems. Economic, cultural and social difficulties in accessing sparse services, and the burden of caring for disabled children were shown to adversely affect maternal mental health. Children attending regular neurodevelopmental follow-ups, however, fared better even at the expense of their mother's psychiatric morbidity. Meanwhile, DSH was experiencing large demand from families for their child development services, and started to assist other hospitals in the late 1990s to develop similar services. Evaluations of 12 such services in Bangladesh found that children from extremely poor families were not availing services at other sites except at one rudimentary programme established with assistance from DSH within Dhaka Medical College Hospital, a key public hospital. This led the DSH team to propose to the Ministry of Health and Family Welfare (MOHFW) to start SBKs within public hospitals.

A public-private partnership was established in 2008, based on the conceptual framework proposed by DSH, under the Health, Population, and Nutrition Sector Development Programme with the following objectives:

- To establish child and family-friendly SBKs within key public hospitals across the country.
- To place and train a core team of multidisciplinary professionals, including child health physicians, child psychologists, and developmental therapists, to provide services within these centres.
- To apply standardized tools, methodologies and strategies for early screening, assessment, intervention, treatment and management of the entire range of developmental delays, disorders, impairments and disabilities.
- To conduct epidemiological surveys and clinical research with the aim to build a nationwide, evidence-based health service delivery system and to identify causal risk factors to inform efforts to prevent major childhood disabilities.
- To provide psychosocial services to families and empower parents and primary care-providers to optimise their child's development.
- To provide training and strategies to establish linkages with primary health care services.
- To develop a digital data-base of information related to child development and disability across Bangladesh.

Structure and governance

Multidisciplinary SBKs were established in key tertiary medical college hospitals (i.e., the apex tertiary hospital of each administrative region) by the Directorate General of Health Services, MOHFW, Government of Bangladesh. SBKs are now under operation in 15 tertiary government hospitals and the programme was recently extended to 8 semi-government and private hospitals to meet the needs of higher income-level urban families which were not availing services at the public institutions. Services are anchored in pediatric outpatient departments. Being located within the health infrastructure and in medical college hospitals ensures free access for at-risk children from the newborn period through adolescence as well as their disempowered families; provides linkages with other relevant departments such as Obstetrics and Gynecology, Otolaryngology, Ophthalmology, Physical Medicine, and Psychiatry; and enables placement and thus capacity building of undergraduate and postgraduate medical students. Health, nutrition and child protection services are integral to the programme. Local links with similar or related services at lower-level health facilities are informally maintained. The SBK programme is administered centrally through a public-private partnership between the MOHFW and the Department of Pediatric Neuroscience at DSH. The latter serves as the National Coordinators of the programme responsible for funds disbursement, hiring, training, facilitating coordination across SBKs, monitoring and evaluation, continuing medical education, and further programme development. National links across the SBKs are maintained through Continuing Medical Education events held by national forums such as the *Shishu Bikash* Network; the Bangladesh Society for Child Neurology, Development and Disability; the Bangladesh Association for Child and Adolescent Mental Health, etc.

The programme is funded through a combination of government and development funds under the Health, Population, and Nutrition Sector Development Programme which are passed through the Executive Committee of the National Economic Council guided by their Five-Year Plan (currently the 2011-2016 Five Year Plan). The MOHFW is contemplating inclusion of the services within the revenue (national) budget, in which case SBKs will become an integral part of every Pediatric Department.

Implementation

The target group of the SBKs is all children 0-18 years of age with concerns about their neurodevelopmental functions raised by parents, other primary care-providers, schools, health professionals and others. The focus is on children and families, especially mothers. Key programme components include diagnosis of neurodevelopmental impairments, disabilities and handicaps followed by guidelines for appropriate interventions, through generic and specific clinics, with appropriate and available investigations where needed, followed by a maximum of 6 follow-up visits; more follow-up visits are conducted if there is evidence of ongoing and treatable pathology (e.g., seizure disorders). Referrals are made to health, nutrition and social services and appropriate school placement. The multidisciplinary teams at the SBKs undergo a three-month structured training at well-baby clinics and in the assessment, diagnosis and management of a range of neurodevelopmental disorders, including motor disorders, vision and hearing impairments, cognitive and language disorders, behavioral problems, mental health disorders including autism spectrum disorders, childhood epilepsies, etc., through which they develop the expertise to run generic and specific clinics. Child protection and family counseling are integral to the training. In addition, locally adapted, validated tools were developed by the DSH team in collaboration with the Bangladesh Protibondhi Foundation (BPF), a non-governmental organization for developmentally disabled children, for home-based screening, and community- and clinic-based assessments of a range of neurodevelopmental disorders, so that community workers could be trained in their application in remote populations. A tiered system of referral from home-based screening to community- and clinic-based functional assessments to SBK-based diagnostic workups was piloted in 2013 and is in the process of being scaled up. Multidisciplinary teams also conduct outreach programmes in primary health care centres to assess children identified by screening to be at-risk for impairments or disabilities. Portable EEGs and other technologies are being utilized for those requiring diagnostic investigations.

Between 2009 to June 2015, there were 157,000 child visits to the 15 government hospital SBKs (clinical services began in the first 5 SBKs in 2009; the second 5 SBKs in 2010; and the third 5 SBKs in 2014).

Using home-based screening and community- and clinic-based assessment tools, DSH together with the assistance of the SBKs conducted a large-scale epidemiological survey across Bangladesh using a three-stage screening-assessment-diagnosis methodology. The door-to-door epidemiological survey was conducted in 2013 and covered 7200 rural and urban children in 8 sub-districts in the 8 administrative divisions of the country. Results are available at <http://www.hsmdghs-bd.org/SKB-01.htm>.

Monitoring and evaluation

All services are digitalized, data are entered regularly in an SPSSpc software programme, centrally monitored every month by DSH and uploaded monthly on the website of the Directorate General of Health, MOHFW, Government of Bangladesh, where information and data are regularly updated for public awareness, information dissemination and accountability (website: <http://www.hsmdghs-bd.org/SKB-01.htm>).

Monitoring activities include regular (monthly) monitoring and clinical audit of process data through a web interface; skype meetings between the government SBKs and the DSH team; DSH team visits to SBKs across Bangladesh at least once a year resulting in detailed confidential reports for each multidisciplinary team member; close contact with respective heads of Pediatric Departments, under whose jurisdiction the individual SBKs operate locally; and national workshops, seminars and training programmes for individual professionals (i.e., child health physicians, child psychologists, developmental therapists) run at least bi-annually. Tracking is maintained of participation in clinical and academic sessions of the respective Department of Pediatrics; quality of attendance in workshops and training programmes in various forums throughout the year by each specific multidisciplinary team member; presentation of each SBKs' work in local and national conferences; and publication by team member(s) in peer-reviewed journals.

Financial audit is performed annually by the Accountant General's office of the Government of Bangladesh.

Lessons learned for scaling up

Several key lessons for scaling up and sustainability of early child development services have emerged from the SBK programme. We have found that anchoring early child development services in the health sector enables population-based reach to poor children early in life. Development of capacity for child developmental assessment and management by multidisciplinary teams (child health physician, child psychologist, developmental therapist) at SBKs throughout the country now provides the basis for nationwide epidemiological surveillance and for referrals from the grassroots to community clinics and then to hospitals at the sub-district and district levels and to the SBKs in tertiary hospitals. Beginning in public medical facilities at DSH enabled child developmental services to be linked to child health services that families were already utilizing and trusted. This facilitated access to and acceptance of services, and accelerated the growth of demand for early child development services, particularly among the poor.

Anchoring services in medical facilities also enables institutionalization of early child development. The SBKs provide for training and capacity building in child developmental services of undergraduate and postgraduate students; assessment of knowledge of child development is now part of national medical examinations. This is an important way of spreading and ensuring the sustainability of the services. A major challenge of the programme is to go beyond the SBKs to develop para-professional and professional expertise within all local administrative hospitals, so that an umbrella of neurodevelopmental surveillance can be provided to every child, with a tiered system of referral (i.e., from home-based services to community- and clinic-based assessments and interventions to hospital-based diagnosis and appropriate referral and interventions for the breadth of neurodevelopmental disabilities). A current barrier to spread is the need for a structured course for training and formal recognition of Developmental Therapists, a key member of the multidisciplinary team at the SBKs.

We have favored "quality over quantity" and found that this is important for sustainability; otherwise, parents keep 'shopping' for services which depletes their scarce resources. Establishment of public-private partnership has also been critical to success. Governmental funding and facilities have been necessary for achieving national scale, while research, managerial and technical inputs from DSH and BPF have ensured that services are evidence-based and that quality is maintained. Paradoxically, to achieve greater equity, spreading to private health facilities has been necessary to enable reach to higher-income level families, as many children from privileged backgrounds, especially children with autism, were failing to avail services in the public system.

Finally, linkage to education, social protection and child protection is critical to impact and sustainability. The BPF has established early mother-child intervention programmes and inclusive schools offering school meals adjacent to several of the SBKs where children are referred for education and rehabilitation purposes. This is a model for integration of health, nutrition, education and social protection which the programme is striving to replicate system-wide.

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Web Appendix 5:

Policies supporting families

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In most of the areas discussed in this series, national government action is required in order to scale up to a level that is near universal and to ensure that these programs are sustainably and affordably accessible to the families with the lowest incomes. While civil society efforts are crucial for innovation, testing and demonstrating new models, few non-governmental organizations have the capacity to sustainably fund programs at scale. Just as government action was necessary to make public primary and secondary school and health care universal, so too, government action will be necessary to make most programs universally available for young children.

How much is known about what national governments are doing to support 0-5 year olds? Globally comparative data is available in five key areas: the availability of paid leave for new mothers, the availability of paid leave for new fathers, the availability of breastfeeding breaks, policies that support families with young children exiting poverty, and the availability of free pre-primary school. In the section that follows, we present analyses of national laws, policies, and UN reporting mechanisms. These analyses examine the amount, duration, and coverage in these five areas. The policies vary by country income levels as show in Table 1.

Table 1: Key policies to support early child development by country income level

	All countries	Low-income countries	Middle-income countries	High-income Countries
Availability of paid parental leave for new mothers and fathers				
No paid leave	8 (4%)	0 (0%)	7 (7%)	1 (2%)
Fathers only	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Mothers only	91 (47%)	23 (64%)	53 (52%)	15 (27%)
Both parents	94 (49%)	13 (36%)	41 (41%)	40 (71%)
Breastfeeding breaks at work				
Not guaranteed	51 (27%)	11 (31%)	25 (25%)	15 (27%)
Guaranteed until child is 1 – 5.9 month old	2 (1%)	0 (0%)	2 (2%)	0 (0%)
At least 6 months unpaid	2 (1%)	0 (0%)	0 (0%)	2 (4%)
At least 6 months paid	137 (71%)	24 (69%)	74 (73%)	39 (70%)
Any leave for children's health needs				
No leave	77 (42%)	18 (51%)	48 (50%)	11 (20%)
Only available to mothers	5 (3%)	0 (0%)	3 (3%)	2 (4%)
Unpaid leave for both parents	19 (10%)	4 (11%)	8 (8%)	7 (13%)
Paid leave for both parents	84 (45%)	13 (37%)	37 (39%)	34 (63%)
Level of minimum wage per day				
No national minimum wage	22 (12%)	4 (13%)	12 (13%)	6 (12%)
\$2.00 PPP or less	11 (6%)	10 (32%)	1 (1%)	0 (0%)
\$2.01 - \$4.00 PPP	29 (16%)	12 (39%)	17 (18%)	0 (0%)
\$4.01 - \$10.00 PPP	43 (24%)	5 (16%)	35 (37%)	3 (6%)
More than \$10.00 PPP or set by collective bargaining	72 (41%)	0 (0%)	29 (31%)	43 (82%)
Tuition-free pre-primary education				
No widespread system of public, free pre-primary	93 (57%)	22 (88%)	53 (57%)	18 (40%)
1 year free	30 (18%)	1 (4%)	16 (17%)	13 (29%)
2 years or more free	40 (25%)	2 (8%)	24 (26%)	14 (31%)

Source: WORLD Policy Analysis Center, UCLA

*Totals may not add to 100% due to rounding.

Extent of Global Policies and Programs at Scale

Paid Parental Leave

Paid maternal leave benefits children's health. It has been associated with a range of positive maternal and child health outcomes a higher rate of child immunizations and more well-child visits.^{1,2} It can increase initiation and duration of breastfeeding.^{2,5,6} Evidence confirms that parental leave significantly reduces infant and child mortality rates. A global study paid leave for new mothers found that an increase in paid maternal leave of ten full-time equivalent weeks was associated with 9 to 10 percent lower neonatal mortality, infant mortality, and under-five mortality rates. Even among high-income countries where risks to young children's health are fewer, parental leave markedly reduces mortality. A study of 18 OECD countries over a 30-year period and a subsequent study of 16 European country both found significant impacts of parental leave.^{7,8} Fathers are more involved with their young children when they take a leave from work; fathers who have taken leave continue to take on more child care responsibilities after the leave ends.⁸⁻¹⁰

The benefits of mother's having time off around the birth or adoption of a child have long been recognized in international agreements. In 1919, the International Labour Organization adopted its first Maternity Protection Convention. The Convention was revised in 1952 and then again 2000 when accompanying Recommendations first mention parental leave available to either parent. To date, no convention on paternity leave has been adopted.¹¹⁻¹³

Over the last two decades, the world has made progress on the availability and quality of parental leave. Since 1995, 8 countries have enacted paid maternal leave, 55 approved an increase in leave duration, and 21 increased their wage replacement rates. The proportion of countries across all three income groups offering full pay or close to it grew from 66% in 1995 to 73% in 2014. Today, in all but eight countries paid maternal leave is guaranteed and most countries provide at least 12 weeks paying at least two-third of workers' wages. The majority of countries with paid maternal leave (142) guarantee between 85% and 100% of wages for all or part of the leave period through some combination of employer, employee, and government contributions. Twenty-three countries provide a maximum of between 66% and 84% of wages, seventeen countries provide less than 66% of wages, and four countries provide a flat rate or adjusted flat rate benefit. However, important policy gaps remain. While 94 countries, or 49% of the world, encourage more men to participate in caregiving by making leaves available to both mothers and fathers, only 77 countries provide paid leave specifically designated for fathers, and 81% of them provide it only for two weeks or less - far shorter than most maternal leave.

Breastfeeding Breaks

Breastfeeding has substantial documented health benefits for mothers and children.¹⁴ It is associated with decreased malnutrition, increased rates of infant survival, and a decrease in risks of childhood illness diarrheal, respiratory, ear, and other infections.¹⁵ Breastfeeding is also associated with improved intellectual development, school performance, and productivity.¹⁶ Breastfeeding also has important effects on maternal health including, among others, reduced risk of premenopausal breast cancer and a potentially lower risk of ovarian cancer.¹⁷ Because of extensive evidence of important health impacts, many international organizations, including the World Health Organization, have agreed that exclusive breastfeeding for infants should last until six months (180 days) of age.¹⁸⁻²⁰ While breastfeeding rates vary greatly around the world, overall most women do not meet these recommendations. Women who work away from home and have to return to work following their child's birth, especially those who return to work full-time,²¹ are less likely to maintain breastfeeding,²²⁻²⁴ even when they have the same interest in breastfeeding as that of non-working women.²⁵ Prior research indicates that when paid breastfeeding breaks are guaranteed, rates of exclusive breastfeeding are higher.²⁶

Recognizing the importance of enabling all mothers to breastfeed, the Beijing Declaration and Platform for Action calls on governments to both "promote the facilitation of breast-feeding for working mothers"²⁷ and "enable mothers to breast-feed their infants by providing legal, economic, practical and emotional support."²⁸ This prioritization of breastfeeding is also reflected in the International Labour Organization's (ILO's) Maternity Protection Convention, updated in 2000, which establishes the right to paid daily time off for breastfeeding through either breaks or reduction in working hours.²⁹

In the last twenty years, the share of countries that did not have laws providing breastfeeding breaks decreased from 37% to 28%. South Asia and the Middle East and North Africa have shown the largest increase between 1995 and 2014: the proportion of countries providing breastfeeding breaks in both regions increased by more than 15%.

Today, most countries in the world have policies that provide for breastfeeding breaks at work and in the vast majority of cases this is paid. One hundred thirty-nine countries guarantee breastfeeding breaks for at least the 6 months WHO recommends exclusive breastfeeding, and in 43 countries both paid breastfeeding breaks and paid maternal leave are guaranteed for this period.

Paid leave for child healthcare

The ability to take leave to care for children's health is crucial to nurturing care for young.³⁰ When young children are sick or injured they may need an adult to bring them to a doctor's office or hospital and often need additional care. At home, parents can help improve children's health outcomes in many ways including by maintaining daily medical routines, administering medication, and providing emotional support as children adjust to having a chronic physical or mental health problem. Research has shown that when parents are available to provide care, children are more likely to recover more rapidly from injuries and illnesses.^{31,32} Whether for out-patient procedures or more serious conditions requiring hospitalization³² children have better physical and mental health outcomes when parents participate in their care.³⁴⁻³⁸ Parents' presence with children while they were in the hospital reduced the length of hospital stays by 31 percent.³⁹ "An intervention study examining the effects of increased parental involvement in post-operative care found that children whose parents were more involved experienced less pain and other negative effects than children whose parents were less involved.⁴⁰ Parents' involvement improves outcomes for children with chronic conditions such as epilepsy, asthma, or diabetes.⁴¹⁻⁴³ When parents have paid, job-protected time off from work, it is much easier for them to meet their children's health needs. Research from the United States found that parents whose employers did provide paid sick days were significantly more likely to be able to personally provide care to their sick children compared with parents whose employers did not offer paid sick days.^{44,45} A study of low-income families using nationally representative data from the U.S. came to a similar conclusion.⁴⁶ If parents are not able to take occasional time off from work to care for a sick child, a child may be sent sick to child care, and if contagious risk spreading illness to other children.

The availability of parents is also important for children to receive preventive care, such as medical check-ups, immunizations, and visits to the dentist. For children to receive this care, working parents will need occasional time off from work.^{47,48} In a range of countries, parents report that schedule conflicts and inflexibility interfere with parents' ability to get their children immunized.⁴⁹⁻⁵² Paid sick leave is associated with increased use of pediatric health services.^{3,53}

Eighty-four countries provide paid leave for mothers or fathers that could be used to tend to children's health needs, including leave for family needs, discretionary leave and personal days, 19 provide unpaid leave, and 5 provide paid leave but only to mothers. Fewer countries provide leave specifically for children's health including leave that can be used to address either routine or serious health issues. Sixty provide paid leave specifically for children's health, 15 provide unpaid leave and 5 provide this type of leave only to mothers. Only 38 countries globally provide paid leave specifically for routine health needs. An additional 14 provide unpaid leave and three provide leave for mothers only.

Large gaps remain as 77 countries still do not guarantee any kind of leave that parents can use to meet their young children's health needs, paid or unpaid, A total of 109 countries lack leave that is to be used specifically for children's health needs, and 134 do not guarantee leave specifically for children's routine health needs. Parents in the informal economy have no provision for any of these types of leaves.

Poverty Policy

When parents are not able to earn adequate income to lift their families out of poverty, children's basic needs cannot be met. From health to education, poverty has detrimental effects on early childhood development and children's future life chances. Even a modest increase in minimum wages has a potential to improve the lives of millions of children since for the tens of millions of the world's formal sector workers living in poverty^a raising the minimum

^a The number of workers living in poverty as estimated by the ILO in *Global Employment Trends, 2014* (Annex 3, p. 111, at http://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_233953.pdf) multiplied by the maximum percentage of the labor force in the formal sector in developing countries estimated by: 100% minus the upper-bound estimate of the percent of workers in the informal sector from the Estimate of informal sector share of total employment (7% to 83%) from: Vanek, J, M. Chen, and R. Hussmanns. 2012. "Statistics on the Informal Economy: Definitions, Findings, and Challenges." WIEGO Working Paper No 2. Cambridge, MA, USA: WIEGO.

wage will increase individual earnings,⁵⁴⁻⁵⁸ and has the potential to help families exit poverty.^{b59-63} Country-level studies in developing countries have generally found that raising the minimum wage reduces national poverty rates.⁶⁴⁻⁶⁶ Findings from research in Latin American and Caribbean countries, as well as the United States and United Kingdom demonstrate that raising the minimum wage can raise the earnings of workers in the informal sector as well as the formal sector.^c It has been demonstrated to be feasible to raise the minimum wage, in the range countries commonly do, with little or no diminution in jobs in a range of countries.⁶⁷⁻⁷⁸

The global consensus on the importance of minimum wages is substantial. Guaranteeing an adequate minimum wage has been called for in global agreements since 1928⁷⁴ and been renewed in 1948 in the UNHDR (Article 23),⁷⁵ in 1966 in the ICESCR (Article 23),⁷⁶ and in 1970 in the ILO Convention 131, Minimum Wage Fixing Convention.⁷⁷ WHO policy guidelines for a multi-sectoral approach to Reproductive Maternal Neonatal and Child Health are consistent with this approach,^d linking health and ILO standards.⁷⁷ The World Health Organization Commission on Social Determinants of Health called for legislation and policies to ensure adequate wages for precarious workers, including those in part-time work and the informal economy, as well as the formal economy.^e

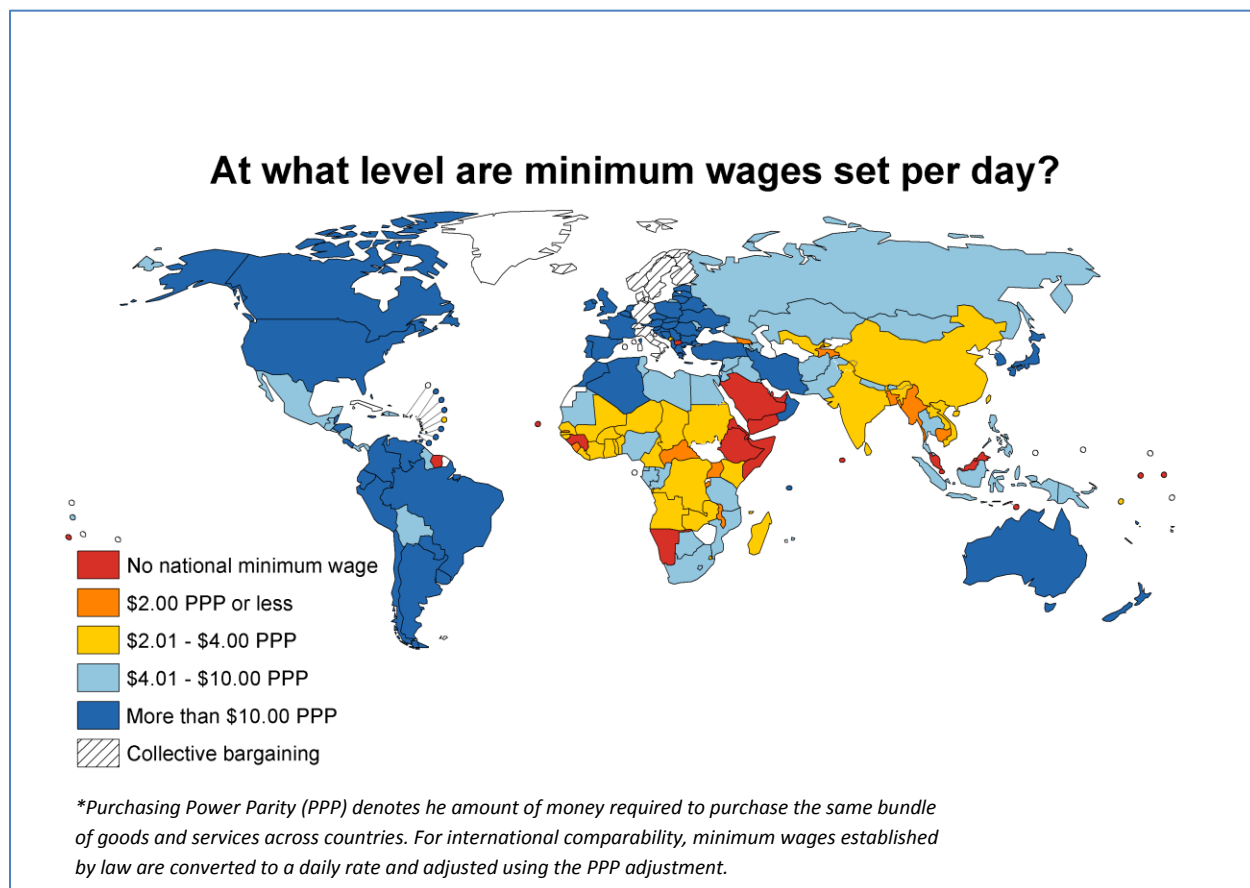
Minimum wage policies are in place in 88% of countries. Although in 41% of countries a minimum wage of more than PPP US\$10/day is mandated, countries still do not guarantee an income that is above the international poverty level of US\$2/day per person for a parent supporting a child, 12% of countries do not have an official minimum wage level set, and in many low- and middle-income countries (55%) the minimum wage growth lags behind the growth of GDP (see Map 1). The need to improve policy is particularly pressing for countries with no minimum wage and those with a minimum wage that leaves households with working adults in poverty.

^b Increases in minimum wages were found to reduce poverty among workers who stayed large firms but not in smaller or uncovered sectors.

^c Referred to as spillover effect or the lighthouse effect the minimum wage in the formal sector establishes a standard for other sectors and/or provides informal sector workers with leverage to bargain for higher wages. See, for example, Maloney W, Mendez J. Measuring the impact of minimum wages. Evidence from Latin America. In *Law and Employment: Lessons from Latin America and the Caribbean* (109-130). University of Chicago Press, 2004; Biero T, Garibaldi P, Ribeiro M. Behind the lighthouse effect, IZA Working Paper; 2010 4890; Khamis M. Does the Minimum Wage Have a Higher Impact on the Informal than on the Formal Labor Market? Evidence from Quasi-Experiments, IZA Discussion Paper; 2008 3911; Gindling TH, Terrell K. The Effects of Multiple Minimum Wages throughout the Labor Market: The Case of Costa Rica. *Labour Econ*; 2007 14485-511; Fajnzylber, P. Minimum Wage Effects throughout the Wage Distribution: Evidence from Brazil's Formal and Informal Sectors. Unpublished paper, Universidade Federal do Belo Horizonte: Department of Economics, 2001; Montenegro, C, Pages C. Who benefits from labor market regulations? Chile 1960-1998. Inter-American Development Bank Working Paper; 2003 494; Kristensen N, Wendy Cunningham W. Do minimum wages in Latin America and the Caribbean matter? Evidence from 19 countries. World Bank Policy Research Working Paper; 2006 3870; 37; Amadeo E, Gill I, Neri M. Brazil: The pressure points in labor legislation. Working Paper, Economics Department of EPGE; 2000 395.

^d The WHO has called for ensuring adequate incomes as an essential part of RMNCH and based this recommendation on tri-partite consensus through the ILO. See, http://www.who.int/pmnch/knowledge/publications/policy_compendium.pdf, accessed January 6, 2016.

^e The WHO has called for ensuring adequate incomes as an essential part of RMNCH and based this recommendation on tri-partite consensus through the ILO. See, http://www.who.int/pmnch/knowledge/publications/policy_compendium.pdf, accessed January 6, 2016.



Map 1. Global provision of minimum wage

Pre-primary Education Provision

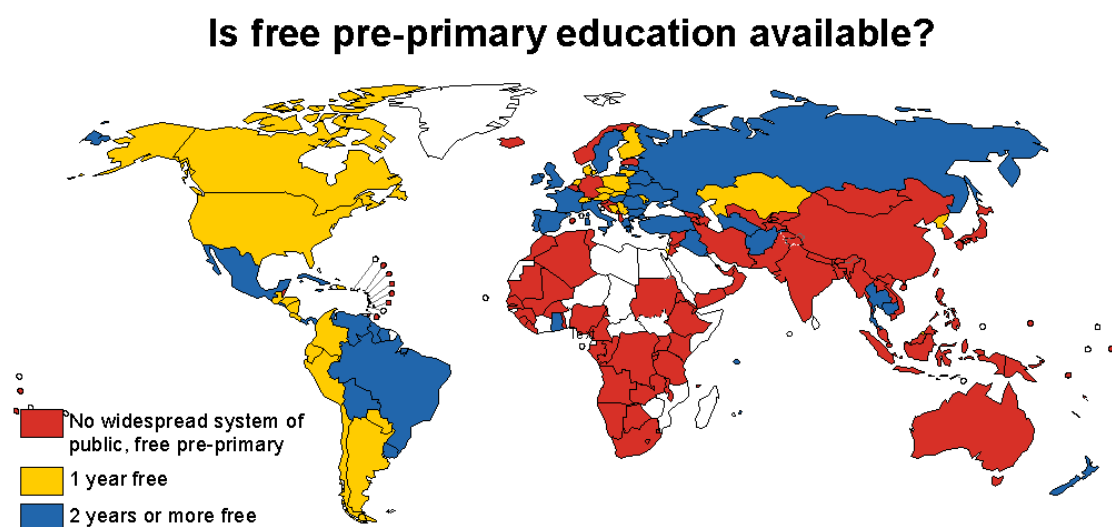
Developmentally appropriate education is critical to early child cognitive development. It is associated with increased primary school retention, higher test scores, and decreased grade repetition in diverse contexts, from Bangladesh to the United States.⁷⁸⁻⁸³ A longitudinal study of pre-primary education in Argentina found that a year of public pre-primary school attendance was associated with an increase of 23 percent of a standard deviation in the distribution of primary school test scores.⁷⁹ Studies in countries as diverse as Chile,⁸⁴ Nepal,⁸⁵ Guinea and Cape Verde⁸⁶ also found that attendance in pre-school was associated with higher test scores. A three-year study in rural Bangladesh found that graduates of pre-primary programs had markedly higher school achievement than children who did not attend.⁸⁷ A cross-sectional study using nationally-representative survey data in Brazil⁸⁸ and longitudinal study of a small program in the United States both found a strong correlation between completion of pre-primary school and lower grade-repetition rates.⁸⁰ Given the benefits of pre-primary education, it is not surprising that the estimated benefit-to-cost ratio for investments targeted at increasing preschool attendance in low- and middle-income countries is quite high, ranging from 6.4 to 17.6.⁸²

Studies from industrialized countries also show that attending pre-primary programs for longer periods of time translates into more significant impacts on educational outcomes⁸⁹ and that this relationship holds regardless of the child's socio-economic background.⁹⁰ Importantly, research from both developed and developing shows that pre-primary education disproportionately benefits poor children.⁹¹⁻⁹⁵ Yet, children from lower-income countries appear to have less access to it. For example, in 2011 the global pre-primary education gross enrollment ratio was 50 percent, but it was only 18 percent in lower-income countries.⁹⁶

Figure 2 shows the availability tuition-free pre-primary education, as defined by and reported to UNESCO, that are legally established and available to the entire age-relevant population in the country or in the case of federal systems

available in the majority of the sub-national units (states, provinces, etc.), irrespective of enrollment rates or availability of private pre-primary schools.

While the world prioritized and made significant progress toward universalizing primary school, there are marked global disparities in the pre-primary educational preparation: only 43% of countries provide at least one year of tuition-free pre-primary education. Of these, 4% are low-income (see Map 2). Free pre-primary is not universal even in higher income countries. In more than a third (40%) of high- and in greater than a half (57%) of middle-income countries free pre-primary education is not available. Very few countries in Sub-Saharan Africa (9%), East Asia and the Pacific (19%) or the Middle East/North Africa (20%) offer at least one free pre-primary year.



These are programmes fitting the UNESCO definition of pre-primary education. The one-year pre-primary programmes are often a year of kindergarten.

Map 2. Global provision of free pre-primary education

Note for Figure: Free pre-primary education is defined here as a programme fitting the UNESCO definition of pre-primary (organized education programs for children between 3 years of age and the age when primary education begins) that is legally available to all age-eligible children and charges no tuition fee, as reported to UNESCO. Programs reflect national policy or, in the case of federal systems, the policy in the majority of the sub-national units (states, provinces, etc.) The one-year pre-primary programmes are often a year of kindergarten.

Only 40 countries provide the recommended two years of pre-pre-primary tuition free. The majority of those are middle- and high-income countries (92%), mostly located in Europe and Central Asia or Latin America and the Caribbean. The global average gross enrolment rates is thirty-four points greater for the countries with free pre-primary education (80%) compared to countries in which it is neither free nor compulsory (46%).

Gaps in Knowledge Regarding National Implementation

There is great deal we still need to learn about the availability at scale of programs supporting the health and development of 0-5 year olds. There is currently insufficient global data to examine the availability of adequate

health coverage for prenatal and perinatal care, healthcare coverage from infancy through school-age, access to nutritional programs, national policies that affect access to clean water and adequate sanitation, and the extent of developmentally stimulating care for children from infancy until pre-primary when most parents are working. There are a number of places where this information on national policies and programs could be routinely collected. Requesting that countries report on developmental and educational programs provided to infants through pre-primary could systematically be done as part of current routine UNESCO reports. Health, nutrition, and clean water and sanitation programs similarly could valuably be collected as part of routine World Health Organization country reporting. Finally, in areas where we do know about laws, policies, and programs, regular data should be collected on the extent and quality of implementation. Analyses of implementation should examine coverage rates both in the formal and informal economy. Existing globally comparative surveys like UNICEF's multi-indicator cluster survey and the demographic and health survey series could valuably be used to collect this implementation data, as could national surveys being conducted by many countries.

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Web Appendix 6:
Building and Strengthening Early Childhood Development Programmes at Scale
Background Paper

Levers for scale-up success in CCT Programs and Implications for ECD

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Abstract

This paper analyzes the factors that contributed to the successful scale up of conditional cash transfer (CCT) programs in Latin America, Africa, and elsewhere. Lessons learned from CCT programs are then applied to the potential for scale of Early Childhood Development (ECD) programs. We provide evidence that CCT programs have reached both national and international scale for the reasons of political popularity, operational ease, advancements in information technology and banking, rigorous evidence that CCT programs are effective, and support from international organizations. Additional insights for CCT program scale revolve around factors of design, law, and government support. Limits to scale are related to budgetary, human resource, design, institutional, and operational factors. Furthermore, fundamental operational differences between CCT and ECD programs make scaling ECD programs much more difficult. ECD practitioners must address supply-side constraints before programs can be scaled. Governments, international organizations, and support service providers can work together to begin laying the groundwork for ECD programs with the potential to scale.

1 Introduction

Conditional cash transfer (CCT) programs are a popular anti-poverty strategy involving the direct distribution of income support paired with conditions meant to build human capital.¹ CCT programs aim to break the intergenerational transmission of poverty by incentivizing parents to invest in education, health, and nutrition of their children, for the most vulnerable populations in a country context.¹ Grounded in a strong evidence base, CCT programs have proven to scale successfully both nationally and internationally.

This paper provides an in-depth analysis of the scale up of CCTs, so as to inform the potential for scaling ECD programs. Over the last twenty years, as a growing number of CCT programs scaled from pilot projects to national level programs, governments around the world have continued to adopt the strategy. Our hypotheses as to the factors that contributed to this success are:

- *CCTs are politically palatable and popular.* We suspect that government officials favorably view the distribution of cash for the potential generation of positive political returns.
- *CCTs are operationally simple to scale.* The roll out design of CCTs allows programs to be scalable in crisis, with flexibility on the operational side. There are three key operational elements to cash transfer programs: (1) identification and enrollment of the target group, (2) the routine delivery of transfers to beneficiaries, and (3) the verification of compliance with program conditionalities. Typically the conditionalities are requirements to obtain services that are delivered by other organizations such as the ministries of health and education. There is no complicated service delivery, and there are cost-savings in terms of providing cash over in-kind aid. Transfers go directly to local distributors, which means less corruption.
- *Recent advancements in information technology, banking and data management have made scaling easier and cheaper.* The expansion of financial institutions to poor areas and developments in mobile banking (prepaid cards, accounts with debit cards, and true mobile money), have dramatically reduced the costs and

risks of implementing cash transfers. Furthermore, advances in information technology have lowered the cost of verifying compliance with conditionalities.

- *The rigorous evidence provided by impact evaluations of CCTs has convinced international agencies to promote CCTs to client countries and to finance scaling.* International organizations, such as the World Bank and Inter-American Development Bank, advise governments and fund anti-poverty interventions. A number of rigorous impact evaluations of CCT programs provided evidence of the effectiveness and these messages were adopted and internalized by international agencies. The evidence provided from evaluations influences agency strategies, development of policy documents of international agencies, advice given to governments, and funding for CCT programs.

Despite the success in scaling CCTs, some of the key elements that seemed to be crucial for scaling CCT programs are not present for ECD programs. The recent explosion in rigorous evidence supporting the short and long term cost-effectiveness of ECD programs has been absorbed and adopted by many international agencies and some governments. First, unlike CCTs, ECD programs are complex requiring both well-training and supervised staff and physical infrastructure. Hence, scaling is operationally complex and there are few economies of scale to be achieved. In addition, there are few technological advancements that are likely to facilitate scaling. Second, the returns to ECD programs are long-term and may not be realized in short political careers, and hence, may have limited political return to government officials.

Support from these hypotheses comes from reviewing the mostly gray literature describing CCT programs and case studies, as well from in-depth interviews with field practitioners on the successful scale up of existing CCT programs. We begin by documenting the rapid scale up and then turn to the gray literature, in-depth interviews, case studies and implications for ECD.

2 Scale-up of CCT Programs

By 2015, nineteen Latin American and Caribbean (LAC) countries had scaled CCT programs (Table 1). We limit this analysis to countries in this region as compiled by the Institute for the Study of Labor (IZA) due to data availability.² The World Bank's most recent collection of data on CCT programs is a 2009 non-exhaustive policy research report detailing targeting methods used in CCT programs, payment schedules, household benefits, conditions, program administration, and the country context (including economics, education, and health statistics).³ The policy research report does provide information on the coverage of CCT programs; however, data is not consistent in terms of targeting population (city, municipality, school, household, family, or individual), or in providing both the initial and scaled level of coverage of multiple CCT programs.² Data provided in the IZA study lists number of CCT program beneficiaries per year, from 2001-2010, in the LAC region by country.

With the exception of Nicaragua, most CCT programs in LAC were able to successfully scale for reasons detailed and discussed below.² Findings from the IZA data show that between 2001-2010, total coverage of CCT programs in LAC grew from 38.3 million beneficiaries to 129.4 million beneficiaries (see table 1). The two largest contributing countries to this growth were Brazil with Bolsa Familia and Mexico with Progresa/Oportunidades. In Brazil, coverage more than doubled from 21.57 million beneficiaries in 2001, to 52.39 million beneficiaries in 2010, accounting for 27 percent of the population. Meanwhile, in Mexico, coverage grew from 15.58 million beneficiaries in 2001, to 27.25 million in 2010, or 24 percent of the population.

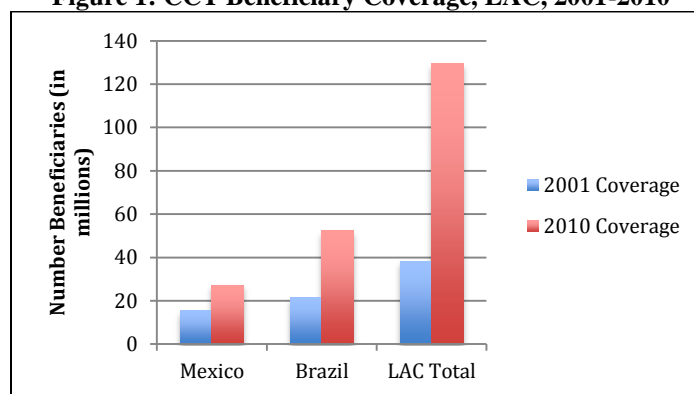
Therefore, we have evidence that most CCT programs in LAC have, in fact, successfully scaled. In the following section we discuss what led to either the successful scale up or termination of CCT programs in both the LAC and African regions, and implications for the potential scale up of ECD programs.

TABLE 1: CCT Beneficiary Coverage by Country in LAC, 2001-2010

Million individuals	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Population (2010)	Beneficiaries/Population (2010)
Argentina					1.12	1.49	2.44	2.83	11.31	11.79	40.41	0.29
Bolivia						3.83	4.19	5.14	5.45	5.69	9.93	0.57
Brazil	21.57	21.52	37.70	42.30	46.13	48.41	46.41	43.29	50.72	52.39	194.95	0.27
Chile		0.19	0.45	0.66	0.78	0.95	1.05	1.15	1.29	1.30	17.11	0.08
Colombia	0.38	1.44	1.58	1.50	2.32	3.15	7.25	7.94	11.57	11.69	46.29	0.25
Costa Rica	0.05	0.04	0.00	0.00	0.00	0.01	0.09	0.12	0.15	0.19	4.66	0.04
Dominican Republic					0.77	0.85	1.22	2.84	2.93	2.98	9.93	0.03
Ecuador			4.00	4.34	4.71	4.90	4.99	5.06	6.27	6.13	14.46	0.42
El Salvador					0.06	0.11	0.23	0.40	0.51	0.57	6.19	0.09
Guatemala								1.55	2.63	3.25	14.39	0.23
Honduras	0.63	0.54	0.43	0.41	0.76	0.66	0.78	1.07	0.78	1.07	7.60	0.14
Jamaica		0.35	0.41	0.41	0.41	0.51	0.58	0.64	0.71	0.83	2.70	0.31
Mexico	15.58	21.62	21.62	25.00	24.50	25.00	25.00	25.25	26.05	27.25	113.42	0.24
Nicaragua	0.06	0.06	0.14	0.14	0.14	0.14					5.79	0.00
Panama					0.02	0.12	0.26	0.43	0.42	0.36	3.52	0.10
Paraguay					0.02	0.05	0.05	0.07	0.52	0.55	6.45	0.09
Peru					0.18	0.88	1.94	2.31	2.25	2.59	29.08	0.09
Trinidad and Tobago						0.02	0.02	0.02	0.03	0.04	1.34	0.03
Uruguay					0.31	0.31	0.32	0.33	0.74	0.76	3.36	0.23
Total	38.27	45.76	66.33	74.76	82.23	91.39	96.82	100.44	124.33	129.43	531.58	0.24

Source: Stampini, Marco & Leopoldo Tornarolli. (2012). The Growth of Conditional Cash Transfers in Latin America and the Caribbean: Did They Go Too Far? IZA Policy Paper No. 49.

Figure 1: CCT Beneficiary Coverage, LAC, 2001-2010



Source: Stampini, Marco & Leopoldo Tornarolli²

3 Literature Review

The review of grey literature on the successful scale up of conditional cash transfer programs provides several insights on the potential factors for success.

Government support for CCT programs. Governments, especially in middle-income countries (MICs), have driven the expansion of CTs (both unconditional & conditional) internationally.⁴ The design of CCT programs requires implementation through government agencies, the establishment of strong ties between federal policy makers and local implementers, and solid fiscal management systems.^{4,5} In addition to operational ease, governments are adopting CCT programs because they are willing to provide direct transfers to people living in poverty, and they trust and empower these people to use the money efficiently.⁴ There is also evidence from a CCT program in Brazil, Bolsa Escola, that first-term mayors achieving positive outcomes associated with a decentralized CCT program are more likely to be elected for a second term.⁶ Therefore, for political reasons government officials may be incentivized to not only implement CCT programs, but to ensure they are actually making progress toward outcome goals.

Operational ease of CCTs over in-kind aid. There is evidence that providing cash transfers is cheaper, faster, and more reliable than providing in-kind aid, making CCTs more attractive to governments.⁷ Moreover there is evidence that improvements in banking and information technology have lowered costs. Governments and donor organizations in LICs are moving away from continually requesting food aid, to implementing more efficient and longer-term CT programs.⁴ This compelling design feature has contributed to the successful scaling of CCT programs both nationally and internationally.¹

Roll out program design built for scale. The first CCT program, originally called Progresa then Oportunidades and now Prospera in Mexico, which began in 1997, was designed to provide treatment to additional target populations over time at the community level, beginning with randomly selected rural communities.^{8,9} Since that time, most CCT programs have incorporated the roll out design, one key factor that has facilitated the successful scale up of CCT programs around the world. Governments may prefer to roll out a program due to administrative or budget constraints, which prevent the simultaneous delivery of service to all eligible beneficiaries at the national level.⁹ Rolling out a CCT program also allows for a more rigorous and credible program evaluation design comparing outcomes among chosen and non-chosen groups.¹⁰

Creating a roll out program design for targeting beneficiaries across geographical contexts but of similar demographic backgrounds (for example, starting with households living in extreme poverty) facilitates the scale up of CCTs.¹¹ Furthermore, objective targeting through proxy-means test or other selection options is essential for scaling up.¹¹

Strong evidence base from impact evaluations. Rigorous impact evaluations have allowed CCT programs to scale nationally and internationally, and to survive changes of political powers.¹ Credible evidence of the impacts of CCT programs supported by quantitative and qualitative research through impact evaluations managed by international organizations, have garnered support from governments and international donors alike.¹ Today, it is the priority of governments to conduct evaluations to prove the effectiveness of CT programs.⁴ Whether conditional and

unconditional, successful CT programs around the world incorporate strong analytical frameworks, along with quantitative and qualitative research.⁵

Support for CCTs by the international community. Successfully scaled CCT programs receive long-term funding and support from various development partners.⁵ Multilateral donors have helped spread CCTs internationally by financing programs, with the World Bank being the world's largest donor to CCT programs as of 2012.¹² The two largest CCT programs to date, Bolsa Familia in Brazil and Progresa/Oportunidades in Mexico, scaled thanks to large amounts of funding from the World Bank and Inter-American Development Bank.¹² Other major donors are also now supporting CCT programs, including the Asian Development Bank, the African Development Bank, and high-income economies (HICs) such as Australia, Germany, Japan, the United Kingdom, and the United States.

The international community not only finances CCT programs, but also promotes knowledge sharing on CCTs and welfare reform among practitioners. These activities have accelerated the implementation of CCT programs internationally.¹ South-South sharing of both evaluation findings on the effectiveness of CT programs, and of good practices, has driven the global expansion of CT programs.⁴

Findings from this literature review support our hypothesis that the successful scale up of CCT programs has been driven by political popularity, operational ease, a strong analytical foundation, and the support of international organizations. We also discover that evidence from impact evaluations does not only motivate international organizations to implement CCT programs, but it drives government participation, as well.

Additional research conducted through interviews with program experts from the World Bank and Inter-American Development Bank builds on the findings from this literature review, and advances the understanding of the successful scale up of CCT programs. We also pay specific attention to the unique operational differences between CCT and ECD programs, which informs our recommendations on how to apply lessons learned from CCT programs for the potential scale up of ECD programs.

4 Interviews with Key Informants

As a supplement to the literature review, we also conducted interviews with international development practitioners with experience working directly in the deployment of CCT programs around the world (see Appendix 1). We reached out to professional contacts at both the World Bank and Inter-American Development Bank, as well as with national program leaders who were involved in designing, monitoring, evaluating, and managing CCT programs in Latin America, the Caribbean, and Africa. We also interviewed one colleague with previous experience in planning and evaluation of a CCT program on behalf of an implementing government.

We questioned interviewees on their specific involvement with CCT programs, the scale up of those CCT programs, and their thoughts on our four-fold research hypothesis (that is, political popularity of CCTs, operational ease, technological advancements, and support from international organizations) (see Appendix 2). Interviewees also provided us with grey literature sources, as well as connections to additional field experts.

Interview Findings

Interviews with international development practitioners experienced in CCT program design, monitoring and evaluating, and management, led to insights around the reasons for successful scale up of CCT programs.

CCT programs are politically favorable. There is strong government ownership of CCT programs, and political support for targeted programs that induce social mobility. Governments are attracted to CCTs because they can scale relatively quickly, paying people cash is tangible and politically popular, they generate positive net flows to countries, and there is evidence of strategy effectiveness (F. Regalia, personal communication, February 17, 2015). Impact evaluations and strong monitoring systems, with both operational and performance indicators, allow governments to work with international organizations to continually improve program processes and outcomes (M. C. Steta Gandara, personal communication, February 23, 2015).

There is some disagreement among interviewees on whether governments favor CCTs because of an expectation that they will generate political returns. On the one hand, large-scale programs can provide returns to governments in power through eliciting votes (M. C. Steta Gandara, personal communication, February 23, 2015); however, social protection systems involve an element of transparency, specifically to ensure that they are not diverted for political gain (P. Premand, personal communication, February 10, 2015). Governments support CCT programs because they provide directly observable benefits to populations, with a clear operational process (P. Premand, personal communication, February 10, 2015).

CCT programs are easier to implement than in-kind transfers. CCTs are easier operationally to implement than in-kind transfers, if the conditionalities are not too strict (P. Ibarrarán, personal communication, February 19, 2015). Reasons for this operational ease include advancements in technology, the ability to identifying regional and national level staff to manage the programs, and the predictable disbursement flows as opposed to complicated procurement processes (F. Regalia, personal communication, February 17, 2015). CCTs are not intense in human capital, especially with less rigorous restrictions on case management and conditionalities (M. C. Steta Gandara, personal communication, February 23, 2015). Furthermore, the decentralized design of CCTs allows for processes to scale (M. C. Steta Gandara, personal communication, February 23, 2015). Federal governments decide the design, strategy, amount of transfers, and conditionalities, but the real operations of the program, including identification of families, targeting, selection, and verification of co-responsibilities, is at the municipality level (M. C. Steta Gandara, personal communication, February 23, 2015).

CCTs are also more efficient and cheaper than providing in-kind transfers (F. Lamanna, personal communication, February 17, 2015). For these reasons, as well as the fact that CCTs include pre-existing targeting mechanisms and payment systems, CCTs are able to scale rapidly. Although there is a high fixed cost with setting up the systems, once they are in place the marginal costs are lower (P. Premand, personal communication, February 10, 2015). Building the systems first is the key variable to scaling up the cash transfer programs quickly (P. Premand, personal communication, February 10, 2015).

It is important to note that as opposed to CCTs, unconditional cash transfers (UCTs) are even easier operationally (P. Premand, personal communication, February 10, 2015). There is also an effort to build out social protection systems and systematic business delivery processes around UCTs (P. Premand, personal communication, February 10, 2015). With these processes and without the conditionalities, UCT programs can scale at an even faster rate than CCTs.

Support from international organizations based on detailed program evaluations. The World Bank and Inter-American Development Bank have provided both financial and evaluation support to CCT programs, with evidence of impact through evaluations leading to the scale up of these programs (P. Ibarrarán, personal communication, February 19, 2015). Such evidence includes the fact that CCT programs are improving on reaching outcomes related to both consumption and investments (P. Premand, personal communication, February 10, 2015). Support from international organizations is especially useful in MICs and LICs, and the World Bank in particular has played an important role in promoting and implementing CCTs (F. Regalia, personal communication, February 17, 2015).

Support from international organizations for knowledge sharing. In many country contexts, international organizations are responsible for designing CCT programs and policies. To support the continued scale up of CCT programs the World Bank and the United Nations Children's Fund (UNICEF) organized "communities of practice" in Africa and Latin America where practitioners can exchange learning's, knowledge, and experience on programs (P. Premand, personal communication, February 10, 2015). The growing evidence of the positive impact of cash transfers has helped the dialogue, and CCTs are now seen as not only handouts, but as productive investments (P. Premand, personal communication, February 10, 2015). Although there is still some skepticism toward the implementation of CCTs in certain country contexts, and they are still considered by some as handouts, the knowledge sharing fostered by international organizations has helped grow and advance the scale up of CCT programs around the world.

The role of technology in the scale up of CCT programs. Technological solutions for the implementation and evaluation of CCT programs are continuing to advance the processes for scale (M. C. Steta Gandara, personal communication, February 23, 2015). As CCTs have spread around the world, advancements in technology have improved procedures for identifying beneficiaries, creating rosters of beneficiaries, data collection, and payment delivery (F. Regalia, personal communication, February 17, 2015; and M. C. Steta Gandara, personal communication, February 23, 2015). Countries continue to share learnings on technological solutions through innovative IT platforms or payment mechanisms for the expansion of CCT programs (F. Regalia, personal communication, February 17, 2015). There has been a recent movement away from providing physical cash to electronic cash, introducing various electronic payment technological solutions, such as electronic transfers and mobile money (M. C. Steta Gandara, personal communication, February 23, 2015). These innovations continue to improve the operational ease and speed of scale of CCT programs.

Limits to the scale up of CCT programs. Not all CCT programs have scaled successfully. Limits that slow or prevent scale include fiscal constraints, lack of regional or national staff to manage programs, ineffective distribution mechanisms, supply-side constraints such as lack of educational or health services, and institutional

weaknesses (P. Ibarrarán, personal communication, February 19, 2015; P. Premand, personal communication, February 10, 2015; and F. Regalia, personal communication, February 17, 2015). In the rare case of the Atención a Crisis program in Nicaragua, the strategy was unable to survive the political transition in 2006 (P. Premand, personal communication, February 10, 2015; and F. Regalia, personal communication, February 17, 2015).

5 Case Studies

To further support evidence provided on the successful scale up of CCT programs and the potential to scale ECD programs, we provide detailed evidence through case studies of the two largest CCT programs to date, Bolsa Familia in Brazil, and Progres/Oportunidades in Mexico. Interviewees mentioned common themes in additional countries, including Bolivia, Colombia, the Dominican Republic, El Salvador, Honduras, Nicaragua, Panama, and Peru, but the Brazil and Mexico cases are the most complete.

Prospera/Progres/Oportunidades

Prospera, formally known as Oportunidades and before that Progres, began in Mexico in 1997 and was the first cash transfer program.⁹ The program provided direct cash transfers to mothers in poor households with children meeting specific educational and health conditions.⁸ The purpose of the program was to provide short-term income support to households living in poverty, while simultaneously investing in human capital. Oportunidades has successfully reached national scale, serving 27 million beneficiaries as of 2010.²

The reasons that Oportunidades was able to scale mirror the findings presented in the literature review and practitioner interviews. Because Oportunidades incorporated rigorous monitoring and evaluation standards, and the evaluation was able to provide evidence for the effectiveness of the program, the strategy withstood the change of political party in 2000 (M. C. Steta Gandara, personal communication, February 23, 2015). After only three years of the program, evaluators showed evidence of positive outcomes in education, health, and nutrition.² Supportive evidence was also provided from monitoring, process evaluations, and social audits from the grievance and claims systems.

Furthermore, the program was designed for scale with its roll out program strategy. Oportunidades was first delivered in extremely poor rural municipalities. After proof of effectiveness, the new administration then expanded the program to poor rural areas, then to urban small cities, and then in 2004 Oportunidades was implemented at the national level in all municipalities of Mexico including metropolitan areas (M. C. Steta Gandara, personal communication, February 23, 2015).

In 2004, the government mandated a law, now a presidential decree, on how to measure poverty and evaluate social welfare programs (M. C. Steta Gandara, personal communication, February 23, 2015). The law created a national level program evaluation, and mandated the federal administration to maintain the program budget for the next year for all programs that are shown to close gaps in human capital or reduce poverty (M. C. Steta Gandara, personal communication, February 23, 2015). After four administrations in the past twenty years, Oportunidades is still in place, and the law helped facilitate the scale up of the program as it continued to meet impact goals.

Another reason for government support of Oportunidades is the fact that in countries with social conflict, programs providing income support to families are viewed as part of national security (M. C. Steta Gandara, personal communication, February 23, 2015). There is an emergency program now in the state of Michoacán, Mexico, using Progres as a capacity for social mobilization (M. C. Steta Gandara, personal communication, February 23, 2015). For these reasons, governments view Oportunidades as politically important, contributing to its success.

Additionally, after proof of effectiveness was made with the first findings presented from the impact evaluation in 2001, the Inter-American Development Bank provided financial and technical assistance, especially to analyze the potential for scale in urban areas (M. C. Steta Gandara, personal communication, February 23, 2015). The World Bank also provided technical assistance, as well as financial assistance around 2008, further supporting the scale up of Oportunidades (M. C. Steta Gandara, personal communication, February 23, 2015).

Technology also played a major role in the successful scale up of Oportunidades (M. C. Steta Gandara, personal communication, February 23, 2015). Technology provides electronic systems for enrolling new beneficiaries, exchanging information, and verifying co-responsibilities of payments for grievances and claims (M. C. Steta Gandara, personal communication, February 23, 2015). This allows for the facilitation of scale up in a short amount of time.

Bolsa Familia

In 2003, the government of Brazil merged four pre-existing cash transfer programs to create Bolsa Familia, the world's largest cash transfer program.¹³ Similar to Oportunidades, the purpose of Bolsa Familia is to provide income transfers to poor families to address short-term issues of poverty, and to invest in human capital through the application of educational and health conditionalities, in order to break the cycle of poverty.¹³ Bolsa Familia has scaled nationally across Brazil, reaching 52 million beneficiaries by 2010, and covering 100 percent of the countries population living in poverty.^{2,13}

The successful scale up of Bolsa Familia, just as with Oportunidades, was built into its program design through the roll out strategy.¹⁴ This strategy was created to allow for the comparison of results between treatment and control groups over time.¹⁴ However, because Bolsa Familia did not include a randomized design or detailed household surveys before the implementation of the program, rigorous impact evaluation was not a factor in its successful scaling.¹⁴

Another similarity between the successful scale up of Bolsa Familia with Oportunidades, is it's grounding in law facilitating the scale up (M. C. Steta Gandara, personal communication, February 23, 2015). Bolsa Familia began as income support as a right of the poor, with a law asserting that the state has to provide income support to beneficiaries living below a certain income level (M. C. Steta Gandara, personal communication, February 23, 2015). The clear operational rules provide an understanding of the role of CCTs in the context of social policy, in terms of providing social assistance to close the gap for the extreme poor (M. C. Steta Gandara, personal communication, February 23, 2015).

Additionally, international organizations have played a key role in providing financial and technical assistance to scale Bolsa Familia (M. C. Steta Gandara, personal communication, February 23, 2015). In 2004 the World Bank provided their first loan to Bolsa Familia, and they are currently involved in a second project with the program (M. C. Steta Gandara, personal communication, February 23, 2015). This information suggests that for Bolsa Familia, it was not the proven success of the program to meet impact outcomes through rigorous impact evaluation, but the assistance of the international community, the legal foundation, and the roll out design of the program, that led to the successful scale up of the program.

6 ECD Programs Potential for Scale

Fundamental operational differences between CCTs and ECDs. There are several factors of CCT programs that are not translatable to ECD programs, and thus, prevent the scale up of ECDs.

Whereas CCT programs are not intense in human capital, ECD programs require the training of service providers, complicating scale up (M. C. Steta Gandara, personal communication, February 23, 2015). Furthermore, a lack of education and health services in certain contexts means that ECD programs are not yet operational for scale (F. Lamanna, personal communication, February 17, 2015). In addition, there are few technological advancements that are likely to facilitate scaling. Also, the returns to ECD programs are long-term and may not be realized in short political careers, and hence, may have limited political return to government officials.

Another difference between CCT and ECD programs is that for CCT programs there are clear institutional anchors, usually the Ministries of Social Affairs, but for ECD programs it is unclear which government agency owns the program (P. Premand, personal communication, February 10, 2015). Moreover, because ECD programs require planning and coordination on the supply side, and therefore cannot scale as quickly as CCT programs, they lack political support. This lack of government focus on ECD programs further hinders scale up (P. Premand, personal communication, February 10, 2015; and F. Regalia, personal communication, February 17, 2015).

Pairing CT programs with ECDs may increase opportunity for scale. It is an assumption of CCTs that supply-side services are in place.¹² Countries that are failing to meet outcome targets face supply-side challenges. As ECDs are human capital intensive, to scale ECDs through CT (either conditional or unconditional) program designs, ECD services should already be available in MICs or better-off areas of low-income counties (LICs).¹⁵ In some geographic contexts facing supply-side constraints, governments and international organizations are funding complementary supply-side services.¹⁵

Although it is difficult for CCT programs to deliver the supply-side educational and health services necessary for ECD program success, pairing ECD programs with existing CT programs can provide access to vulnerable populations to which ECD program administrators might not otherwise have access.¹⁵ CT programs are effective at

generating demand for services, with existing beneficiary targeting systems identifying the most vulnerable portions of the population, evidence of successful delivery of integrated interventions, and the ability to incentivize beneficiaries to make use of existing ECD services or to improve parental and care-giving service delivery.¹⁵

Once governments identify agencies to act as institutional anchors for ECD programs, they will be able to begin addressing supply-side constraints. ECD programs will then only face the same manageable scaling issues encountered by existing CCT programs, and will have the potential to scale successfully.

Findings from the literature review, practitioner interviews and case studies on the factors for the successful scale up of CCT programs lead to several implications for the potential to scale ECD programs:

- Fundamental operational differences between ECD and CCT programs make scaling ECD programs inherently more difficult than scaling CCT programs.
- There is no evidence that ECD programs are operationally easier than in-kind transfers, as supply-side issues grounded in a lack of existing support service infrastructure mean that ECD programs are not yet fully operational.
- The roll out program design facilitates the scale up of CCT programs. However, whereas CCT programs involve very little investments in human resources, ECD programs require specialists at the local level. Thus, as ECD programs are not yet fully operational, the roll out design cannot yet facilitate scale up.
- Political popularity is still an important factor for success in ECD programs, as with CCT programs. Because ECD programs cannot scale as quickly as CCT programs, they may be less politically popular, and not always considered. There is a need for ministry ownership of ECD programs to leverage international support and promote the agenda in country.¹³
- The existing support from international organizations to build the necessary systems to facilitate the delivery of ECD services, suggests that as with CCT programs, international organizations may help drive the scaling ECD programs.
- Conducting impact evaluations of ECD programs may help facilitate scale if they provide evidence on the ability of programs to achieve impact objectives, by signaling the effectiveness of the strategy to other governments and international organizations.
- Technology plays an important role in easing the distribution of cash to beneficiaries in CCT programs, and speeding up the process to scale. As ECD programs require additional human and capital resources for implementation, these technologies do not have the same level of immediate impact on the distribution of services or scale up of ECD programs.

7 Conclusion

There is consistency in the evidence for why CCT programs have successfully scaled both nationally and internationally. Findings from the literature review and practitioner interviews support our original hypothesis that reasons contributing to the scaling of CCT programs include political popularity, operational ease, technological advancements, and support from international organizations.

Our research also provides additional insights, including the fact that grounding program strategies in law may facilitate the scale of programs; the roll out program design is inherently built to scale; impact evaluations garner not only the support of international organizations, but also government agencies; nevertheless, rigorous impact evaluation is not an absolute necessity to achieving scale; and CCTs are politically popular not just because they provide political returns, but also because they can scale relatively quickly, paying people cash is tangible, they generate positive net flows to countries, there is evidence of strategy effectiveness, and they provide directly observable benefits to populations with a clear operational process.

We also found that limits to scale include fiscal constraints, a lack of regional or national staff to manage programs, ineffective distribution mechanisms, supply-side constraints such as a deficiency in educational or health services, institutional weaknesses, and a potential absence of government support for programs.

Lessons learned from the successful scale up of CCT programs provide many insights for the potential to scale ECD programs. However, the fundamental operational differences between CCT and ECD programs make scaling ECD programs much more difficult, and require preliminary actions before scaling becomes an option. Once supply-side constraints are addressed, ECD practitioners can make better use of insights garnered on the successful scaling of

CCT programs. In the meantime, together governments, international organizations, and supply-side support service providers can begin to lay the groundwork for ECD programs with the potential to scale.

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8 Appendices

APPENDIX 1: LIST OF INTERVIEWEES

Government of Mexico

Maria Concepcion Steta Gandara, Former General Director of Planning and Evaluation, *Oportunidades* Human Development Program

Inter-American Development Bank (IDB)

Pablo Ibararán, Social Protection and Health Economist

Ferdinando Regalia, Social Protection and Health Division Chief

The World Bank

Francesca Lamanna, Senior Economist

Patrick Premand, Senior Economist

Laura Rawlings, Senior Monitoring and Evaluation Specialist

APPENDIX 2: INTERVIEW QUESTIONS

Questions

- 1) In terms of your particular experience with a CCT program(s):
 - 1.a) In what country do you have experience?
 - 1.b) What was your role?
 - 1.c) Was the CCT successfully scaled?
 - 1.d) When was this?
- 2) Regarding the scale up of CCTs:
 - 2.a) What led to a successful scale up of the program(s)?
 - 2.b) What was the political climate in the country at the time?
 - 2.c) Were there any roadblocks to scaling up?
 - 2.d) What was the alternative (e.g. status quo, in-kind transfers, etc.)?
 - 2.e) What role did international organizations play in the scale up?
 - 2.f) Did technology facilitate the scale up?
- 3) We are also developing our research hypotheses on why governments like CCTs and what helps with international scalability.
 - Our current hypothesis is three-fold:
 - 1) CCTs are politically palatable and popular;
 - 2) CCTs are operationally easier than in-kind transfers;
 - 3) With the evidence provided by impact evaluations of CCTs, international agencies have gotten behind them and are playing a major role in scaling and moving programs to other countries.
 - Do you agree with this hypothesis?
 - Is there any supporting or conflicting information you can provide?
- 3) Can you provide us with any grey literature you might have on this topic to assist in our research?
 - We are collecting readings such as Aber & Rawlings “North-South knowledge sharing on incentive-based conditional cash transfer programs”.¹
- 4) Would you put us in touch with any colleagues you think might be able to provide us with additional information?

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Web Appendix 7:

Review of Delivery Platforms to facilitate Integration and Scaling up of ECD interventions in the Health Sector

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While there has been substantial growth in essential interventions for maternal and child health (MNCH) in low- and middle-income countries (LMICs), corresponding gains in services for early childhood development (ECD) is limited. There is considerable inequity in the distribution and quality of these services and much interest in strategies as well as delivery platforms for scaling up. This is especially important given the emphasis on universal health care within the sustainable development goals (SDGs). We reviewed the evidence for achieving equitable access and coverage for essential MNCH interventions through delivery channels and platforms using standard methods.

Community delivery platforms: Community-based interventions to improve maternal, newborn and child health are now widely recognized as important strategies to deliver key maternal and child survival interventions. These interventions are delivered by health care personnel or lay individuals, and implemented locally at home, village or any defined community group. A full spectrum of promotive, preventive, and curative interventions can be delivered via community platforms including provision of basic antenatal, natal and postnatal care, preventive essential newborn care, breastfeeding counseling; management and referral of sick newborns; skills development in behavior change communication and community mobilization strategies. A recent review on women's groups facilitated by workers to discuss and solve related problems demonstrated significant impact on reducing maternal mortality (by 37%) and neonatal mortality (23%).¹ Another recent review also suggested a reduction in maternal and neonatal mortality and also showed that these interventions can improve rates of facility births by 20% (RR 1.2; 95% CI 1.04 to 1.39) and result in a two-fold increase in the rate of initiation of breastfeeding within one hour (RR 1.93; 95% CI 1.55 to 2.39).²

We reviewed interventions specific to ECD that were conducted at home or in community settings and were supervised by nurses, psychologists, physiotherapists and community health workers after receiving appropriate training and results from 40 studies suggest significant improvements in cognitive development (SMD: 0.48 95% CI: 0.34, 0.62) and motor development (SMD: 0.36 95% CI: 0.07, 0.64). A significant decrease was also observed in socio-emotional problems in children (SMD: -0.35 95% CI: -0.47, -0.24). Subgroup analysis for LMICs has also shown more pronounced impacts for each outcome assessed.

A review assessed the effect of ECD programmes post hospital discharge delivered in community or at homes of preterm infants at infant (zero to < three years), pre-school (three to < five years) and school (five to < 18 years).³ The interventions included parent-infant relationship and infant development or both and results show that who received early developmental intervention had a higher IQ at infant age (SMD: 0.31 95% CI 0.13 to 0.50) and preschool age (SMD: 0.45 95% CI 0.34 to 0.57), while it was not statistically different at school age. Motor development was also significantly higher in the intervention group at infant age (SMD 0.10; CI 95% 0.00 to 0.19), while not significant at preschool and school age. Early intervention programmes for preterm infants have a positive influence on cognitive and motor outcomes during infancy, with the cognitive benefits persisting into pre-school age.

A review determined the effects of home-based programmes aimed specifically at improving developmental outcomes for preschool children from socially disadvantaged families,⁴ and found that there was no statistically significant impact of the intervention on cognitive development (SMD: 0.30; 95% CI: -0.18 to 0.78) and data on socioemotional outcomes was insufficient.

An important attribute of such community platforms includes demand creation. These approaches can have a huge impact on empowering communities, improving household practices and promoting demand for better maternal and newborn care. Although much of the evidence from large-scale programs utilizing community health workers (CHWs) is of poor quality, process indicators and evaluations do indicate that CHWs were able to implement many

of these projects at scale, and have considerable potential to improve the uptake of child health and nutrition outcomes and reach difficult to access populations.⁵

School-Based Delivery Platforms: Many countries have school feeding programs targeting children > 5 years of age and some also target preschool children. The major purpose of such programs is to provide incentives for school enrollment and evidence of nutrition benefits is limited. Current estimates on coverage suggest that while 49 percent of schoolchildren receive free meals in middle-income countries, the figure for low-income countries is 18 percent.⁶ This suggests that where the need is greatest in terms of hunger, poverty and poor social indicators, the coverage continues to be the lowest. In low-income countries, donor investment accounts for 83 percent of the resources allocated to school feeding programmes.⁶ There is growing excitement around the idea that school feeding programmes that use food produced and purchased locally, or at least within the boundaries of a country, can generate additional benefits for the children involved and also for local farmers, communities and economies.⁶

There is evidence that school feeding programs increase school attendance, cognition, and educational achievement, particularly if supported by complementary actions such as deworming and micronutrient fortification or supplementation.⁷ A review of 18 relevant studies on the effectiveness of school feeding programs in improving physical and psychosocial health for disadvantaged school pupils reported an increase in school attendance by 4-6 days annually and weight gains averaging 0.39 kg (95% CI: 0.11 to 0.67) and 0.71 kg (95% CI: 0.48 to 0.95) over 11 and 19 months respectively.⁸ Math gains were consistently higher for experimental groups in lower income countries. The results were inconclusive for height gain so there caution must be exercised that such programs do not lead to obesity. Guyana school feeding programs have shown a reduction of stunting in children in intervention and children also performed better in national academic assessment tests.⁹ Notwithstanding the limited evidence, schools offer an enormous opportunity for health and nutrition promotion for older children and adolescents and could have an important role in the future.

A review on centre-based day care found only one trial suggesting that these may have a positive effect on child cognitive ability compared with no treatment (care at home) (SMD: 0.74, 95% CI: 0.48 to 1.00).¹⁰

Conditional and Unconditional Cash Transfer Programs: Financial incentives are widely used as policy strategies to ameliorate poverty, reduce financial barriers and improve population health. A review on relevant studies reporting on the impact of financial incentives on coverage of health and nutrition interventions and behaviors targeting children under 5 years of age,¹¹ the review concluded that financial incentives have the potential to promote increased coverage of several important child health interventions, but the quality of evidence available was low. The more pronounced effects seem to be achieved by programs that directly removed user fees for access to health services.¹¹

An analysis of 13 conditional cash transfer (CCT) programmes, whose effects had been evaluated, mostly in Latin-American countries have shown these as valuable tools to address some of the obstacles faced by populations in poorer countries to access health care services, and their results suggest that CCTs have been effective in increasing the use of preventive services, improving immunisation coverage, certain health outcomes and in encouraging healthy behaviours.¹²

The Colombian programme 'Familias en Accion' was found to have improved the nutritional status of newborns and infants but only for children less than 2 years of age.¹³ The Mexican programme, 'Oportunidades' was associated with a better nutritional status and greater growth of children as shown by two separate studies,^{14,15} as well as a lower prevalence of obesity and hypertension amongst adults.¹⁶ While doubling of cash transfers was associated with higher height-for-age Z score (β : 0.20; 95% CI 0.09-0.30), lower prevalence of stunting (-0.10; 95%CI: -0.16 to -0.05), lower body-mass index for age percentile (-2.85, 95%CI: -5.54 to -0.15) and lower prevalence of being overweight (-0.08, 95%CI: -0.13 to -0.03). A doubling of cash transfers was also associated with children doing better on a scale of motor development, three scales of cognitive development and with receptive language.¹⁷ In Nicaragua, the programme was found to have significantly reduced the proportion of underweight and stunted children and had no impact on anaemia prevalence among infants.¹⁸ In the Brazilian programme 'Bolsa Alimentacao', there was increase in the mean variation in weight-for-age z-score and height-for-age for children up to 72 months old who were regular program beneficiaries during the follow-up.¹⁹ Similar scheme in India had an increase in the uptake of antenatal care by 10.9 percentage points and increasing the proportion of women giving birth in facilities by 49.2 percentage points.²⁰ In Columbia, a trial using the infrastructure of a CCT implemented the

integrated ECD intervention on a large scale and showed its potential for improving children's cognitive development.²¹

Nutrition and ECD: The physical and cognitive development of a child in early years is highly dependent on childcare practices and targeting these together can have synergistic effects. Many trials have been conducted to evaluate this and have shown mixed results. A trial in Pakistan showed that children who received enhanced nutrition (nutrition education and multiple micronutrient powders) had significantly higher development scores on the cognitive, language, and social-emotional scales at 12 months of age than those who did not receive this intervention, but at 24 months of age only the language scores remained significantly higher, while there were no additive benefits when responsive stimulation was combined with nutrition interventions.²² An evaluation of ECD programs in Bangladesh shows that ECD programs that are integrated into health and nutrition services are very few in number and even fewer have been evaluated,²³ but limited evidence does suggest that these interventions are promising and there is sufficient evidence on feasibility of integrating ECD activities into nutrition and health programs.²³ A large trial in Columbia assessed the effectiveness of an integrated early child development intervention, combining stimulation and micronutrient supplementation and showed that stimulation improved cognitive scores and also increased receptive language,²¹ while micronutrient supplementation had no significant effect on any outcome and there was no interaction between the interventions.²¹ A trial of home/preschool fortification with multiple micronutrient powder combined with an early child-development intervention is underway which will evaluate the effect on child development, growth, and micronutrient status among infants and preschoolers in rural India.²⁴ A systematic review of integrated nutrition and ECD interventions suggests that nutritional interventions usually benefited nutritional status and sometimes benefited child development, stimulation consistently benefited child development and there was no significant loss of any effect when interventions were combined, but there was little evidence of synergistic interaction between nutrition and stimulation on child development.²⁵ There is no rigorous evaluations of adding stimulation to health and nutrition services at scale and there is an urgent need to determine their long-term effects.

Integrated Management of Childhood Illnesses: WHO, in collaboration with UNICEF and other agencies, developed the Integrated Management of Childhood Illness (IMCI) strategy in the 1990s.²⁶ IMCI includes both curative and preventive interventions targeted at improving the health practices at health facilities and at home. The strategy includes three components: improvements in case-management; improvements in health systems; and improvements in family and community practices. Evaluations of IMCI in Uganda, Tanzania, Bangladesh, Brazil, Peru, South Africa, China, Armenia, Nigeria, and Morocco have shown various benefits in health service quality, mortality reduction, and health care cost savings.²⁷ In Tanzania implementation of IMCI was associated with significant improvements in equity differentials for six child health indicators with the largest improvements were observed for stunting among children between 24-59 months of age.²⁸ Similar findings were reported from Bangladesh where implementation of IMCI was associated with significant increase in exclusive breastfeeding as well as comparatively faster reduction in the prevalence of stunting in children aged 24–59 months.²⁹ In India in the 12 early-implementing districts, the difference was significant only for care-seeking for acute respiratory infection although there was improvement in coverage of all key interventions.³⁰ Based on the early experience of IMNCL, measures need to be taken to improve supportive supervision, availability of essential supplies, and monitoring of the programme if the strategy has to translate into improved child survival.

Child Health Days: Child Health Days have been introduced in weak health systems to rapidly enhance coverage of essential child survival interventions. There are few robust evaluations and published experience with child health days, which commonly include delivery of vitamin A supplements, immunizations, insecticide-treated nets, and deworming medicines. Available evidence suggests that these can achieve greater coverage than stand-alone campaigns in previously low-coverage countries.³¹ A descriptive review of scale-up of child health days from 1999 to 2009³² suggests that these were more effective than stand-alone campaigns provided the number of interventions did not exceed four. The overall equity impact of these approaches are uncertain and further studies are needed to determine how best to integrate this within routine health-care services. The scale-up of CHDs is helping countries to achieve high and equitable coverage of essential health and nutrition services.³³ An economic evaluation also suggests that despite high operational costs, CHDs are a very cost-effective service delivery strategy for addressing the leading causes of child mortality.³⁴

Other Delivery Channels: There are child health interventions which exists for long and have been effective, these channels also offer opportunities to scale up other interventions. One such successful platform is immunization, and

there have been evaluations to gauge the impact of integrating ECD interventions. A trial in Nigeria showed that routine hearing screening of infants attending BCG immunization clinics by community health workers was feasible and effective for the early detection of hearing loss³⁵ and evidence from South Africa also suggest immunization clinics indicate promise as infant hearing screening platforms.³⁶

Despite important scientific advances in how violence against children can disrupt healthy early development, the study of these issues has developed in relative isolation. Violence against children is a risk factor for poor early child development and vice versa, with both sharing important risk and protective factors and overlap between early child development and prevention interventions for violence against children.³⁷ These cannot be separated if significant gains have to be achieved to improved child development and integrated strategies targeting violence and development have to be framed.

Table 1: Effect estimates of delivery channels on various health and development outcomes (based on systematic reviews)

Intervention Delivery	Effect Estimates
Community-based intervention packages for maternal and child health care	Maternal mortality (RR 0.80; 95% CI: 0.64 to 1.00) Maternal morbidity (RR 0.75; 95% CI 0.61 to 0.92) Neonatal mortality (RR 0.75; 95% CI 0.67 to 0.83) Stillbirths (RR 0.81; 95% CI 0.73 to 0.91) Immunisation (RR 1.05; 95% CI 1.02 to 1.09) Use of clean delivery kits (RR 1.82; 95% CI 1.10 to 3.02) Institutional delivery (RR 1.20; 95% CI 1.04 to 1.39) Early breastfeeding (RR 1.93; 95% CI 1.55 to 2.39)
Community based interventions for early childhood development	Cognition (SMD: 0.48 95% CI: 0.34 to 0.62) Motor development (SMD: 0.36 95% CI: 0.07 to 0.64) Socio-emotional (SMD: -0.35 95% CI: -0.47 to -0.24).
ECD interventions post-hospital discharge	Cognition Infant age (SMD: 0.31 95% CI: 0.13 to 0.50) Pre-school age (SMD: 0.45; 95% CI: 0.34 to 0.57) School age (SMD: 0.25; 95% CI: -0.10 to 0.61) Motor Development Infant age (SMD: 0.10; 95% CI: 0.00 to 0.19) Pre-school age (SMD: 0.14 95% CI: -0.16 to 0.44) School age: (SMD: -0.34 95%CI: -0.91 to 0.23)
School feeding for disadvantaged students	Weight gain (MD: 0.39 kg 95% CI: 0.11 to 0.67) over an average of 19 months and 0.71 kg (95% CI: 0.48 to 0.95) over 11.3 months Height (MD: 0.38, 95% CI: -0.32 to 1.08) HAZ (MD: 0.04, 95% CI 0.02 to 0.06) School Attendance: increase of 4 to 6 days a year. Math gains (SMD: 0.66 95% CI 0.13 to 1.18)
Centre-based day care	Cognition (SMD: 0.74, 95% CI: 0.48 to 1.00)
Financial Incentives	<u>CCT</u> Healthcare use by children under age 5 (Risk difference 0.14, 95%CI: 0.03 to 0.26) Any Vaccination 0.22 (0.12; 0.32) <u>Conditional microcredit</u> Early Initiation of breastfeeding (MD: 0.17 95%CI: 0.01 to 0.33) Exclusive breastfeeding (MD: 0.20 95%CI: 0.03 to 0.37) Vaccination coverage (MD: 0.06 95%CI: -0.21 to 0.34) <u>User fee removal</u> Use of curative health services (RD:0.62 95%CI: 0.41; 0.82)

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Web Appendix 8:

Calculation of the marginal costs of adding a nurturing care and support for maternal depression intervention to existing maternal and child health and nutrition services

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In order to estimate the financial implications of expanding early child development (ECD) interventions through health service provision, we developed a model to estimate the marginal costs of two critical interventions with proven effectiveness:¹

1. “Nurturing Care” (NC) consists of counselling interventions directed to parents, designed to strengthen responsive caregiving, child stimulation and learning.
2. “Support for maternal depression” (SMD) entails psychosocial support to mothers, including home visiting, psychosocial education, improvement of mother’s knowledge on child rearing practices and parent training programmes and antidepressant for the subset of mothers with moderate to severe depression.

The projected costs are based on a normative assessment that both these interventions should be provided to all parents during the first year after the child is born.

The methodological framework for the cost simulations draws upon, and is aligned with methods and assumptions used in the Global investment framework (GIF) for women’s and children’s health.² We assume that the two ECD interventions can be integrated with existing packages for maternal and child health such as antenatal care and nutrition counselling.

1. List of countries included in the analysis

Resource needs were modelled by country and year for 73 low and middle income countries (Table 1).

Country	World Bank income Classification (July 2015)	WHO Region
Afghanistan	Low income	EMRO D
Angola	Upper middle income	AFRO D
Azerbaijan	Upper middle income	EURO B
Bangladesh	Lower middle income	SEARO D
Benin	Low income	AFRO D
Bolivia (Plurinational State of)	Lower middle income	AMRO D
Botswana	Upper middle income	AFRO E
Brazil	Upper middle income	AMRO B
Burkina Faso	Low income	AFRO D
Burundi	Low income	AFRO E
Cambodia	Low income	WPRO B
Cameroon	Lower middle income	AFRO D
Central African Republic	Low income	AFRO E

Country	World Bank income Classification (July 2015)	WHO Region
Chad	Low income	AFRO D
China	Upper middle income	WPRO B
Comoros	Low income	AFRO D
Congo	Lower middle income	AFRO E
Côte d'Ivoire	Lower middle income	AFRO E
Democratic People's Republic of Korea	Low income	SEARO D
Democratic Republic of the Congo	Low income	AFRO E
Djibouti	Lower middle income	EMRO D
Egypt	Lower middle income	EMRO D
Eritrea	Low income	AFRO E
Ethiopia	Low income	AFRO E
Gabon	Upper middle income	AFRO D
Gambia	Low income	AFRO D
Ghana	Lower middle income	AFRO D
Guatemala	Lower middle income	AMRO D
Guinea	Low income	AFRO D
Guinea-Bissau	Low income	AFRO D
Haiti	Low income	AMRO D
India	Lower middle income	SEARO D
Indonesia	Lower middle income	SEARO B
Iraq	Upper middle income	EMRO D
Kenya	Lower middle income	AFRO E
Kyrgyzstan	Lower middle income	EURO B
Lao People's Democratic Republic	Lower middle income	WPRO B
Lesotho	Lower middle income	AFRO E
Liberia	Low income	AFRO D
Madagascar	Low income	AFRO D
Malawi	Low income	AFRO E
Mali	Low income	AFRO D
Mauritania	Lower middle income	AFRO D
Mexico	Upper middle income	AMRO B
Morocco	Lower middle income	EMRO D
Mozambique	Low income	AFRO E
Myanmar	Lower middle income	SEARO D
Nepal	Low income	SEARO D
Niger	Low income	AFRO D
Nigeria	Lower middle income	AFRO D
Pakistan	Lower middle income	EMRO D
Papua New Guinea	Lower middle income	WPRO B

Country	World Bank income Classification (July 2015)	WHO Region
Peru	Upper middle income	AMRO D
Philippines	Lower middle income	WPRO B
Rwanda	Low income	AFRO E
Sao Tome and Principe	Lower middle income	AFRO D
Senegal	Lower middle income	AFRO D
Sierra Leone	Low income	AFRO D
Solomon Islands	Lower middle income	WPRO B
Somalia	Low income	EMRO D
South Africa	Upper middle income	AFRO E
Sudan	Lower middle income	EMRO D
Swaziland	Lower middle income	AFRO E
Tajikistan	Lower middle income	EURO B
Togo	Low income	AFRO D
Turkmenistan	Upper middle income	EURO B
Uganda	Low income	AFRO E
United Republic of Tanzania	Low income	AFRO E
Uzbekistan	Lower middle income	EURO B
Viet nam	Lower middle income	WPRO B
Yemen	Lower middle income	EMRO D
Zambia	Lower middle income	AFRO E
Zimbabwe	Low income	AFRO E

Table 1: List of countries included in the analysis

2. Scenarios and coverage targets

The analysis project an increase in coverage of the two ECD interventions over time from 2016-2030 through three simulation scenarios: low, medium and high (Table 2).^a We compare the investments needed in the two scale-up scenarios (Medium, High) with the baseline scenario of constant coverage (Low). While detailed data on current coverage for these interventions is lacking, based on expert opinion we estimated coverage for NC to be around 5% coverage in low income countries (LICs) and 10% in middle income countries (MICs). For SMD, we estimated 10% current coverage in LICs and 20% in MICs. We assume that with an integrated delivery approach, coverage can be increased over time and align with coverage targets set within the GIF for the “complementary feeding counselling and support” (CFCS) intervention.

^a The GIF Medium scenario assumes intervention coverage to continue increasing according to available historic trends. The GIF High scenario uses a best performer approach whereby coverage increases according to the best performer of each intervention and country classification.

Scenarios for NC and SMD	Description
<p>LOW scenario</p> <p>(Maintaining current coverage)</p>	<ul style="list-style-type: none"> • Coverage is flat lined at a constant (2015) level • No additional training or media activities • No extra human resources requirements
<p>MEDIUM scenario</p> <p>(Continuing historical trends)</p>	<ul style="list-style-type: none"> • Rates of coverage are increased linearly from current estimates such that they align with coverage targets set within the GIF Medium Scenario for the “complementary feeding counselling and support” (CFCS) intervention from 2023 onwards, by country. • Coverage for the two ECD interventions across the 73 high burden countries reaches an average of 58% by 2030
<p>HIGH scenario</p> <p>(Accelerated scale- up scenario)</p>	<ul style="list-style-type: none"> • Rates of coverage are increased linearly from current estimates such that they align with coverage targets set within the GIF High Scenario for the “complementary feeding counselling and support” (CFCS) intervention from 2023 onwards, by country. • Coverage for the two ECD interventions across the 73 high burden countries reaches an average of 98% by 2030

Table 2: Description of the three scenarios

For both the Medium and High scenario we assume frontloaded investments in in-service training of health workers to ensure that there is capacity built up within the system to enable coverage of ECD interventions to expand. Our model assumes a rapid linear scale up until ECD interventions reach the same level as the projected coverage for complementary feeding counselling and then aligns with this coverage curve from 2023 onwards (Figure 1). Coverage trajectories are country specific and are available from the authors on request.

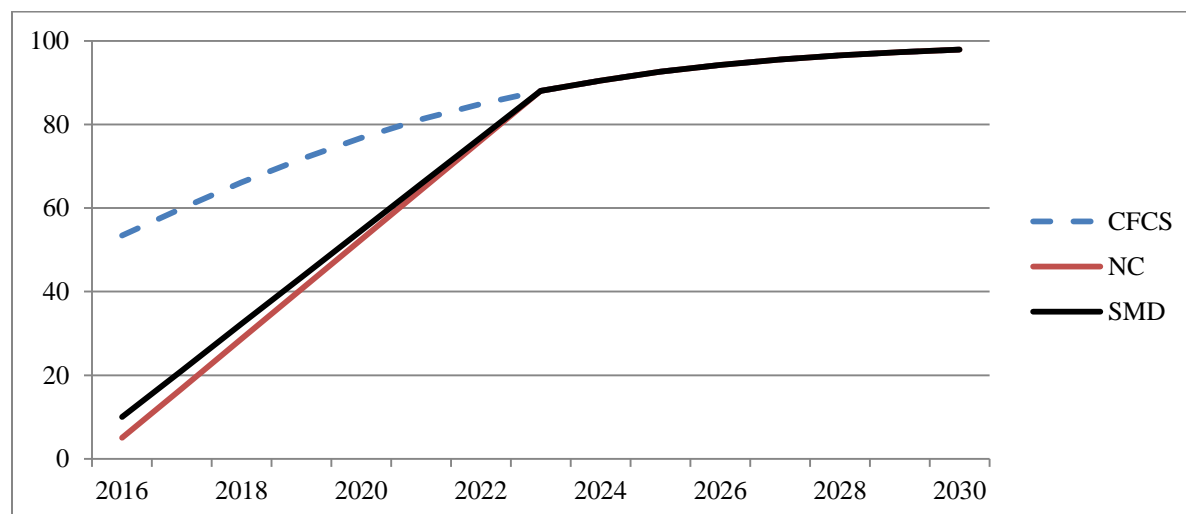


Figure 1: Projected coverage trajectory (Low income country example, High scenario)

3. Methods for estimating cost

Costs were estimated by country using an ingredients approach with quantities of inputs based on WHO recommended practices and applying country-specific price data, as outlined below. Analysis was conducted using MS Excel 2010. Estimates are presented in 2011 USD.

a. Service delivery cost

It was assumed that the two ECD interventions would be delivered at multiple levels of the health system as per assumptions outlined in tables 3 and 4. The number of visits per child at each level was thus computed and

multiplied by the estimated country-specific costs for outpatient visits, as obtained from the WHO-CHOICE database^b, with predicted costs referring to public provider institutions:

- For outpatient visit costs at hospital level, we used country-specific WHO-CHOICE estimates for primary level hospital.
- For outpatient visit costs at clinic level, we used country-specific WHO-CHOICE estimates for health centre with no beds.
- For outpatient visit costs at outreach level, we used country-specific WHO-CHOICE estimates for health centre with no beds.
- For outpatient visit costs at community level, we assume that costs are one-third of estimates for health centre with no beds.

It was further assumed that the unit cost of a visit related to an average duration of 10 minutes.^{3,4}

The intervention-specific assumptions are outlined below:

Nurturing care	Quantity assumption
Number of visits:	Quantity
Number of visits per targeted mother ^c	6
Delivery Channel:	Percentage
Community	40%
Outreach	10%
Clinic	50%
Hospital	0%

Table 3: Assumptions used for calculating outpatient visit costs for NC intervention

Support for maternal depression	Quantity assumption
Global Health data:	Percentage
Prevalence of moderate-severe depression	20% ^d
Number of visits:	Quantity
Number of screenings ^e per targeted mother	5
Number of counselling sessions ^{f,5} per positive screened mother	5
Delivery Channel:	Percentage
Community	40%
Outreach	10%
Clinic	50%
Hospital	0%

Table 4: Assumptions used for calculating outpatient visit costs for SMD intervention

^b <http://www.who.int/choice/cost-effectiveness/inputs/en/>

^c Approximate time spent during an antenatal care session is assumed to be 5 minutes.

^d Expert opinion

^e Assumes one screening visit of 5 minutes.

^f It is estimated that each counselling session takes 45 minutes.

b. Commodity cost

Commodity cost were only estimated for the SMD intervention. It is anticipated that 50%^g of mothers with moderate severe depression will require antidepressant medication (fluoxetine). The daily dosage considered is 30 mg for 12 months. The price was obtained from the Management Sciences for Health (MSH) database.⁶

c. Human Resource requirements

Estimates of Full Time Equivalent (FTE) health workers to provide the interventions were calculated based on where the services were targeted to be provided. For outreach and clinic level we assumed that a nurse will provide the service whereas at community level a trained Community Health Worker (CHW) will provide the care. We assume that the number of working hours per day is 8 hours for the Nurses and 4 hours for the CHW, with a total of 220 working days per year.

d. Training cost

The projected costs includes three activities related to training and supervision:

- Basic course
- Training of trainers
- Supervision of trainees

Table 5 outlines the approach taken to estimate costs for the basic training course for the two interventions. We assumed that 40% of the relevant cadres should be trained on providing the ECD interventions on the assumption that multi-purpose health workers on average devote 40% of their time to providing care to children under-five years of age.⁷ The model includes costs in relation to per diem, meeting room rental, training equipment etc., with country-specific prices taken from the WHO-CHOICE database.

Item	NC	SMD
Nurses to be trained, out of total	40% ⁷	40% ⁷
CHWs to be trained, out of total	40% ⁷	40% ⁷
Size of Training Class: Basic Course	25	25
Length of training: Basic Course (days)	3	3

Table 5: Training assumptions for NC and SMD

e. Media and outreach costs

The projected cost also includes information and communication activities in relation to the ECD interventions. Assumptions on quantities are outlined in Table 6. Prices were taken from the WHO-CHOICE database.

Item	Quantity assumption
Brochures/Leaflets	One brochure per 10 people receiving the intervention
Pens	One pen for 100 people receiving the intervention
Development of video/Documentary	Production cost for a video in year 2016, to be aired continuously over the scale-up period as part of information campaigns

Table 6: Assumptions used for calculating Media costs

4. Results

The analysis estimates the marginal cost of increasing intervention coverage above current (2015) estimated coverage. The two scale-up scenarios (High and Medium) were thus compared with the baseline scenario (Low) which assumes constant coverage.

^g Expert opinion.

a. Total cost, by cost category

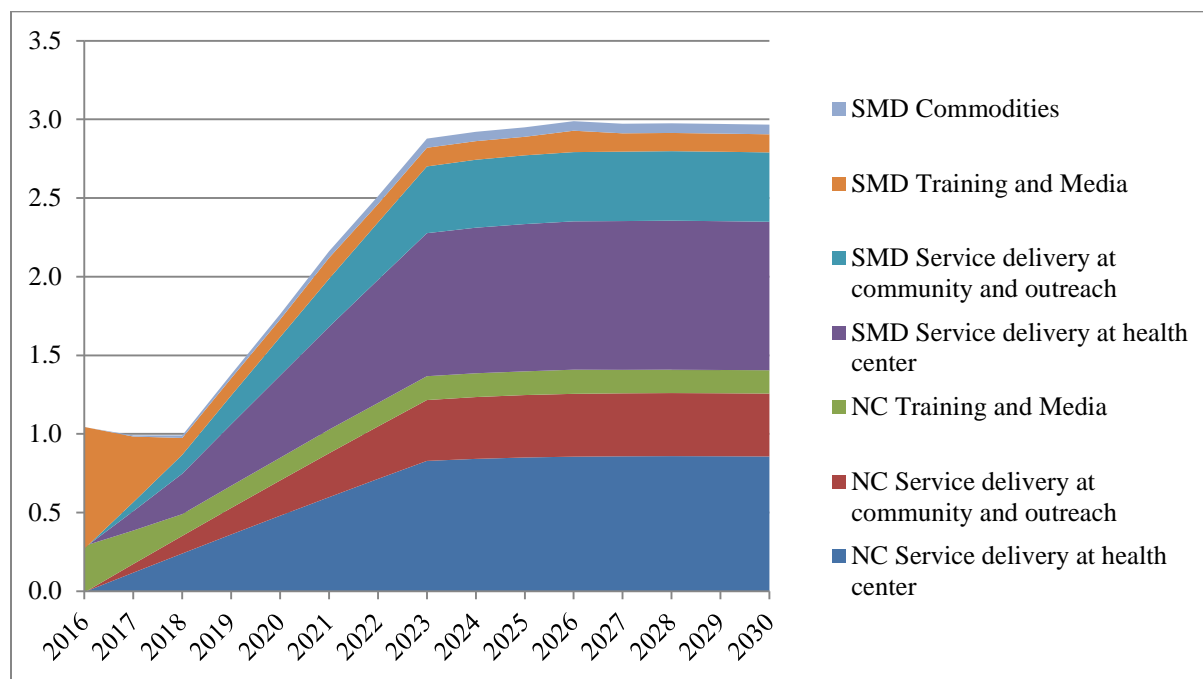


Figure 2: Additional costs by cost category for NC and SMD interventions (High vs Low scenario, 73 countries, in billion USD 2011)

b. Total cost, by income classification

World Bank income Classification (July 2015)	Countries	HIGH Scenario (Incremental costs compared to LOW scenario, in billion US \$) (Total 2016-2030)	HIGH Scenario (Incremental per capita costs compared to LOW scenario, US \$) (Year 2030)	MEDIUM Scenario (Incremental costs compared to LOW scenario, in billion US \$) (Total 2016-2030)	MEDIUM Scenario (Incremental per capita costs compared to LOW scenario, US \$) (Year 2030)
Upper Middle Income	11	8.0	0.3	4.1	0.2
Lower Middle Income	32	7.4	0.2	3.5	0.1
Low Income	30	0.7	0.1	0.4	0.0
Total	73	16.1	0.2	8.0	0.1

Table 7: Additional estimated costs for Nurturing Care intervention, by income category for High and Medium compared to Low scenario (USD 2011)

World Bank income Classification (July 2015)	Countries	HIGH Scenario (Incremental costs compared to LOW scenario, in billion US \$) (Total 2016-2030)	HIGH Scenario (Incremental per capita costs compared to LOW scenario, US \$) (Year 2030)	MEDIUM Scenario (Incremental costs compared to LOW scenario, in billion US \$) (Total 2016-2030)	MEDIUM Scenario (Incremental per capita costs compared to LOW scenario, US \$) (Year 2030)
Upper Middle Income	11	9.4	0.4	4.4	0.2
Lower Middle Income	32	8.1	0.2	3.1	0.1
Low Income	30	0.9	0.1	0.5	0.1
Total	73	18.4	0.2	8.0	0.1

Table 8: Additional estimated costs for Support for Maternal Depression intervention, by income category for High and Medium scenario compared to Low scenario (USD 2011)

i. Sum costs for NC and SMD combined

World Bank income Classification (July 2015)	Countries	HIGH Scenario (Incremental costs compared to LOW scenario, in billion US \$) (Total 2016-2030)	HIGH Scenario (Incremental per capita costs compared to LOW scenario, US \$) (Year 2030)	MEDIUM Scenario (Incremental costs compared to LOW scenario, in billion US \$) (Total 2016-2030)	MEDIUM Scenario (Incremental per capita costs compared to LOW scenario, US \$) (Year 2030)
Upper Middle Income	11	17.3	0.7	8.5	0.3
Lower Middle Income	32	15.5	0.4	6.6	0.2
Low Income	30	1.6	0.2	0.9	0.1
Total	73	34.5	0.5	16.0	0.2

Table 9: Additional estimated costs by income group for SMD and NC interventions combined, High and Medium compared to Low scenario (USD 2011)

c. Estimated costs by WHO region

WHO Region	Countries (Number)	HIGH Scenario (Incremental costs compared to LOW scenario, n billion, US \$) (Total 2016-2030)	HIGH Scenario (Incremental per capita costs compared to LOW scenario, US \$) (Year 2030)	MEDIUM Scenario (Incremental costs compared to LOW scenario, in billion, US \$) (Total 2016-2030)	MEDIUM Scenario (Incremental per capita costs compared to LOW scenario, US \$) (Year 2030)
AFRO D	21	1.0	0.16	0.7	0.14
AFRO E	19	2.9	0.33	1.6	0.16
AMRO B	2	1.7	0.40	1.0	0.24
AMRO D	4	0.3	0.32	0.3	0.31
EMRO D	9	1.1	0.17	0.6	0.10
EURO B	5	0.2	0.23	0.1	0.13
SEARO B	1	0.9	0.29	0.5	0.15
SEARO D	5	2.4	0.13	0.5	0.03
WPRO B	7	5.6	0.25	2.6	0.12
Total	73	16.1	0.22	8.0	0.11

Table 10: Additional estimated costs for Nurturing Care intervention by WHO region, High and Medium compared to Low scenario, (USD 2011)

WHO Region	Countries (Number)	HIGH Scenario (Incremental costs compared to LOW scenario, in billion, US \$) (Total 2016-2030)	HIGH Scenario (Incremental per capita costs compared to LOW scenario, US \$) (Year 2030)	MEDIUM Scenario (Incremental costs compared to LOW scenario, in billion, US \$) (Total 2016-2030)	MEDIUM Scenario (Incremental per capita costs compared to LOW scenario, US \$) (Year 2030)
AFRO D	21	1.1	0.16	0.8	0.14
AFRO E	19	3.0	0.31	1.6	0.13
AMRO B	2	2.0	0.46	1.1	0.26
AMRO D	4	0.3	0.35	0.3	0.33
EMRO D	9	1.2	0.18	0.6	0.10
EURO B	5	0.2	0.26	0.1	0.13
SEARO B	1	1.1	0.34	0.5	0.15
SEARO D	5	2.8	0.15	0.3	0.01
WPRO B	7	6.7	0.29	2.8	0.11
Total	73	18.4	0.24	8.0	0.10

Table 11: Additional estimated costs for Support for Maternal Depression intervention, by WHO region for High and Medium compared to Low scenario (USD 2011)

WHO Region	Countries (Number)	HIGH Scenario (Incremental costs compared to LOW scenario, in billion, US \$) (Total 2016-2030)	HIGH Scenario (Incremental per capita costs compared to LOW scenario, US \$) (Year 2030)	MEDIUM Scenario (Incremental costs compared to LOW scenario, in billion, US \$) (Total 2016-2030)	MEDIUM Scenario (Incremental per capita costs compared to LOW scenario, US \$) (Year 2030)
AFRO D	21	2.2	0.32	1.5	0.28
AFRO E	19	5.9	0.64	3.2	0.29
AMRO B	2	3.6	0.86	2.2	0.50
AMRO D	4	0.6	0.68	0.6	0.64
EMRO D	9	2.3	0.35	1.2	0.20
EURO B	5	0.4	0.48	0.2	0.26
SEARO B	1	2.0	0.63	0.9	0.30
SEARO D	5	5.1	0.27	0.8	0.04
WPRO B	7	12.3	0.54	5.4	0.23
Total	73	34.5	0.46	16.0	0.21

Table 12: Additional estimated costs for NC and SMD interventions combined, by WHO region for High and Medium compared to Low scenario (USD 2011)

d. Human resources requirements

Health worker category	HIGH Scenario (Incremental FTEs compared to LOW scenario, year 2030, in thousands)	MEDIUM Scenario (Incremental FTEs compared to LOW scenario, year 2030, in thousands)
Nurses	46	26
Community Health Workers	73	35

Table 13: Additional full time equivalent health workers needed in High and Medium scenario compared to Low scenario, 73 countries total

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Web Appendix 9:

Estimating adult income loss per at risk child in 2010

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Following the same method described in the Table 6 of the 2007 study,¹ we estimated the average percentage of potential annual adult income loss per at risk child in 2010 resulting from deficit of schooling associated with being exposed to stunting or extreme poverty. We updated the estimates used in the 2007 study by conducting a comprehensive literature review for all peer-reviewed publications after 2007 on (1) schooling loss (including school performance) due to stunting or poverty or both, and (2) adult income loss due to deficit of schooling years.

We updated Table 6 in the 2007 study¹ using the most recent evidence derived from longitudinal data. For example, in the 2007 study, using data from Brazil,² the deficit in school grades attained was estimated as 0.91 associated with stunted only, 0.71 associated with poor only, and 2.15 associated with both stunting and poor. A longitudinal study of children in Guatemala published in 2013 found that being stunted at the age of 24 months was associated with a loss of 4.64 grades of schooling (95% CI = -7.82, -1.47, $p = 0.004$) controlling for household wealth and other factors.³ The Guatemala study does not specify grade loss associated with being (1) stunted only (not living in poverty) and (2) stunted and in poverty. We decomposed the grade loss associated with being stunted into these two components based on their ratio in the 2007 study ($0.91/2.15=0.42$, Column 1 in Table 6 of the 2007 study). We therefore split the loss of 4.64 grades (and its 95% CI [-7.82, -1.47]) into 1.38 (associated with being stunted only, 95% CI [-0.44, -2.31]) and 3.26 (associated with being both stunted and living in poverty, 95% CI [-1.03, -5.51]). We did not find updated information about the grade loss associated with living in poverty only, we therefore adopted the estimate in the 2007 study (0.71). The 2007 study did not provide the 95% CI for this estimate, we used information in Table 5 and Table 6 in the 2007 paper and generated its 95% CI (0.64, 0.78) (**Column 2 in Table 1**).

Using data from the Philippines,⁴ the 2007 study estimated that a 0.72 SD lower scores for reading and math was equivalent to two fewer years of schooling.¹ The 2013 Guatemala study found that stunted children received approximately one SD lower scores on both the language test (-1.26, 95% CI [-2.26, -0.27]) and the cognitive test (-1.12, 95% CI [-2.02, -0.33]).³ We took the average of the SD lower scores of the two tests and converted it into the loss of schooling years with uncertainty levels (3.30, [0.83, 5.77]). We assigned the estimates to “stunted only” and “stunted and poor” in the **Column 3 of Table 1**. We concede that the loss of learning associated with “stunted and poor” could be under-estimated due to lack of direct evidence. We know of no studies that provide an estimate of deficit in learning ability per grade in grade equivalents for children living in poverty only. We followed the 2007 study and treated it as zero and concede that this may have underestimated the true loss. Following the 2007 method, **Column 4** is the total deficit in school grades, which is the sum of Columns 2 (deficit in school grade attained) and 3 (deficit in learning ability per grade in grade equivalents).

Column 5 in Table 1 presents the percentage of potential annual income loss in adulthood related to loss of one year of schooling. Based on a study of 51 countries and one longitudinal study from Indonesia,^{5,6} the 2007 study assumed that one year of schooling increased annual adult income by 9%.¹ A new literature review on publications after 2007 found four peer-reviewed publications and one report from the World Bank that estimates the associations between schooling and adult income using cross-sectional data.⁷⁻¹¹ The estimated return to each year of schooling ranged from 1.89% in Egypt⁷ to 16.4% in Tanzania⁸ (see **Table 1** in the web appendix 2). The average of these estimates is 8.2%, very close to the 9% used in the 2007 paper. It has been suggested that cross-sectional estimates of return to schooling tend to be biased due to lack of control for unobserved factors such as ability, motivation, and family connection.¹³⁻¹⁵ In further analysis, we therefore decided to rely on estimates generated from the longitudinal study in Indonesia which produced estimates of economic returns to schooling ranging from 6.8 to 10.6%. We took the average of these two estimates (8.7%) and produced mean and uncertainty levels for percentage loss of adult yearly income per grade (8%, [6.4% and 9.6%]). For example, when assuming economic return of one grade of schooling is 6.8%, a reduction of one year of schooling would lead to a fall in adult income by 6.4% ($(1/(1+6.8\%)) - 1 = -0.064$).

Column 6 in Table 1 estimates the total percentage loss of adult annual income associated with being stunted only, living in poverty only, and being both stunted and living in poverty. The estimates in this column were obtained using information in columns 4 and 5. For example, if we want to generate the lower bound estimate of the total % loss of adult yearly income, we will use all lower bound estimates in column 4 and column 5 to conduct estimation: the estimated total percentage loss of adult annual income from being stunted only would be 7.95% ($(1/(1+6.4\%)^{1.26} - 1)$), 4.2% ($(1/(1+6.4\%)^{0.64} - 1)$) from living in poverty only, and 11.6% ($(1/(1+6.4\%)^{1.87} - 1)$) from being both stunted and living in poverty.

Column 7 in Table 1 displays numbers and percentage of children younger than five years in the 141 low- and middle-income countries in the three categories: stunted only (106.5 million), living in poverty only (75.6 million), or being both stunted and living in poverty (67.2 million) in 2010. These numbers are found in Table 3 in Black et al (this volume).

Using information in Columns 6 and 7, we calculated the weighted average deficit and its uncertainty levels in adult yearly income for the 249.3 million at risk children to be 26.6% with uncertainty levels between 8% and 44.4% (**Column 8 in Table 1**).

Table 1: Loss of schooling associated with stunting or extreme poverty, and percentage of potential loss in yearly adult income associated with deficit of schooling in 141 developing countries in 2010

	Deficit in school grades attained	Deficit in learning ability per grade in grade equivalents	Total deficit in grade equivalents	% loss of adult yearly income per grade	Total % loss of adult yearly income (compounded)	Number (%) of at risk children younger than 5 years in developing countries	Average % loss of adult yearly income per disadvantage child
(1) Stunted only	1.37 (0.43, 2.31)	3.30 (0.83, 5.77)	4.67 (1.26, 8.08)	8.0 (6.4, 9.6)	42.3 (8.0, 55.7)	106.5 (18.5%)	26.6 (8, 44.4)
(2) Poor only	0.71 (0.64, 0.78)	$\geq 0^1$	≥ 0.71 (0.64, 0.78)	8.0 (6.4, 9.6)	5.8 (4.2, 7.6)	75.6 (13.1%)	
(3) Stunted and poor	3.26 (1.04, 5.51)	≥ 3.30 (0.83, 5.77)	≥ 6.56 (1.87, 11.28)	8.0 (6.4, 9.6)	32.4 (11.6, 67.9)	67.2 (11.7%)	
Data sources	Brazil ² and Guatemala ³	Guatemala ³ and 2007 estimates ¹	Sum of columns 1 and 2	Indonesia ⁶	Combining columns 4 and 5	See Table 1 in paper 1	Weighted average from columns 6 and 7

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Web Appendix 10:

Systematic Review

Effects of poverty and stunting on schooling and adult income, and effects of schooling on adult income

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Review search strategy and selection criteria

We conducted a comprehensive systematic literature review examining how risks related to stunting and poverty associated with to 1) loss of schooling and 2) loss of adult income. We also reviewed how schooling deficits related to reduced adult income. All literature searches were conducted between January and June 2015. We searched the following database: MEDLINE (PubMed), ISI web of science (Web of Knowledge), Science Direct, Cochrane Review, Campbell Library and the World Bank's Open Knowledge repository and World Bank e-library for articles published since the review conducted in series from 2007.¹ The search terms included: "poverty", "low-income", "poor", "stunting", "stunted", "growth", "schooling", "school", "education", "grades", "academic", "earnings", "income", "wage", "salary". All abstracts were read by the first reviewer who selected the relevant studies based on the following inclusion predetermined criteria: 1) the study examined risks related to stunting, poverty or loss of schooling, 2) the study was conducted in a low or middle-income country, 3) the study was conducted in generalizable populations, 4) the study was published in a peer-reviewed journal or report. We also searched for literature published in English. All selected studies were then read by both the first and a second reviewer.

Childhood poverty and educational attainment

Low educational attainment among poor children presents an important contributing factor to the persistence of poverty in developing countries.² Still, there is little direct evidence of the association between childhood poverty and later educational attainment. We identified only one new longitudinal study published since the review in 2007. Using longitudinal data from the Philippines, Carvalho found a positive association between parental income during early childhood and educational attainment at the age of 21 years.³ A 10% increase in family income was for instance found to correspond to a 0.03 increase in years of children's schooling, suggesting that children from poor families completed fewer years of education. Parental income was also associated with children's scores in academic tests at the age of 11 such that a 10% increase in household income was found to associate with an increase in the math and English test scores by 1.2% of a standard deviation.

Childhood stunting and educational attainment

We identified one new longitudinal study from Guatemala, which examined how childhood stunting (defined as z-scored height-for-age [HAZ] below 2.0) was associated with children's educational attainment. This study found that being stunted at the age of 24 months was prospectively associated with a loss of 4.64 grades of schooling (95% CI = -7.82, -1.47, p = 0.004).⁴

Childhood growth and educational attainment

Other studies have related childhood growth (using HAZ at age 24 months a continuous variable) to educational attainment. Victora et al.⁵ examined data from five longitudinal cohorts from Brazil, Guatemala, India, the Philippines and South Africa and found strong positive associations between HAZ and educational attainment in all five cohorts. Only subgroup, namely the female sample from the South African cohort did not show a significant effect of HAZ on schooling. The pooled estimate was highly significant and suggested that a one z-score increase in HAZ was prospectively associated with 0.48 years more years of schooling in males (estimate = 0.48, 95%CI = 0.32, 0.51) 0.53 more years of schooling in females (estimate = 0.53, 95%CI = 0.03, 0.06, p < 0.0001) across studies. The effects observed by Victora et al.⁵ have later been confirmed in more recent analyses using the same data from Guatemala⁴ and the Philippines³ who in addition of the negative impact of poor growth on schooling also found that poor growth was associated with poorer performance on academic tests of cognition, language or mathematics.

Finally, a longitudinal study that used panel data from Zimbabwe similarly found a childhood HAZ was positively associated with educational attainment.⁶

Effects of childhood poverty on adult income

Despite strong evidence for intergenerational transmission of poverty in developed countries, we identified only one longitudinal study of associations between household income in early childhood and adult earnings. This study from the Philippines, however, did not find evidence of a significant effect of childhood poverty on adulthood income measured at the age of 21.³ Of note, analyses were adjusted for parental education. Given that there was a significant effect of maternal education on income, this may have removed some of the effect of household income.

Effects of childhood stunting on adult income

One study from Guatemala examined how childhood stunting related to adulthood income.⁴ Hoddinott et al., did not find an effect of stunting on adulthood wages or total earned income.⁴ Note, however, that they did find some effects of stunting on later economic outcomes, namely that adults who had been stunted at the age of 24 months had 53% lower household per capita expenditure (95% CI = -73, -18, $p=0.006$) and 42% greater probability of living in poverty (95% CI = 2, 82, $p=0.04$).

Childhood growth and adult income

The previously mentioned study by Victora et al.,⁵ also provides strong evidence for an association between poor childhood growth and poor economic outcomes later in life. Victora et al.⁵ found positive associations between HAZ at the age of two and adulthood income in Brazil and Guatemala and between HAZ and accumulation of assets in India. For males, they found that a 1 z-score increase in HAZ was associated with an 8% increase in income in Brazil (95% CI = (0.05, 0.11, $p<0.0001$)). A similar 8% increase in income with a 1 z-score increase in height-for-age was observed in Guatemala although this effect only reached borderline significance in the adjusted analyses taking into account socio-economic status (95% CI = -0.01, 0.17, $p=0.07$). Finally with a 27% increase in adulthood household assets in India (95% CI = 0.20; 0.35, $p<0.0001$). For females, Victora et al.⁵ found that a 1 z-score increase in HAZ was associated with an 8% increase in income in Brazil (95% CI = 0.04; 0.12, $p<0.001$), a 25% increase in income in Guatemala (95% CI = 0.02; 0.47, $p=0.03$), and a 18% increase in assets in India (95% CI = 0.08; 0.28, $p<0.001$). In the Philippines Carvalho replicated the finding of positive associations between childhood HAZ and earnings at the age of 21 years (estimate = 0.06, 95% CI = 0.08, 0.02, $p<0.01$).³

Impact of reduced schooling on adult income loss (economic return to schooling)

We did not identify any peer-reviewed longitudinal studies that have examined how years of completed schooling relate prospectively to income in adulthood.

We identified four publications and one World Bank report that estimated the return to schooling using cross-sectional data, published since 2007. The studies were conducted in the following countries: Benin, Brazil, Burkina Faso, Chile, Colombia, Costa Rica, Cote D'Ivoire, Egypt, El Salvador, Mali, Mexico, Nicaragua, Niger, Peru, Senegal, Tanzania, Togo, and Uruguay. Data were collected between 2001-2008 (see table below for details).

The estimated return to each year of schooling ranged widely from just 1.89% in Egypt in 2006⁷ to 16.4% in Tanzania (females only) in 2004.⁸ The average of these estimates across studies is 8.2%, very close to the 9% estimated return to each year of schooling reported in the paper from 2007.¹

Table 1. Estimated income return to schooling with cross-sectional data reported in five publications using data from 18 low and middle-income countries.

Author (publication year)	Time of data collection	Country	% return to a year of schooling	95% CI of available
Alderman, Hoogeveen & Rossi 2009 ⁶	2004	Tanzania	8.3	§
Kuepie et al. 2009 ¹⁰	2001-2003	Benin	5.8	§
	2001-2003	Burkina Faso	6.9	§
	2001-2003	Cote D'Ivoire	3.3	§
	2001-2003	Mali	3.3	§
	2001-2003	Niger	3.8	§
	2001-2003	Senegal	5.9	§
	2001-2003	Togo	4.4	§
Aedo & Walker 2012 ⁹	2008	Brazil	10.0	§
	2006	Chile	12.0	§
	2008	Colombia	12.0	§
	2008	Costa Rica	9.0	§
	2008	El Salvador	8.0	§
	2008	Mexico	12.0	§
	2005	Nicaragua	10.0	§
	2008	Peru	11.0	§
	2008	Uruguay	10.0	§
Biltagy 2012 ⁷	2006	Egypt	1.89	95% CI = 0.02, 0.01
Elu & Price 2013 ⁸	2004	Tanzania [females]	16.4	95% CI = 0.17, 0.15
	2004	Tanzania [males]	10.2	95% CI = 0.11, 0.09
AVERAGE RETURN TO SCHOOLING in %			8.2	

§ = 95% CI or SE not provided

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Web Appendix 11:

Cost of Inaction (CoI) for reducing inequities in stunting

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Abstract

The study assesses the cost of inaction (CoI) for reducing socio-economic status (SES) inequities in stunting prevalence for children 0-24 months. We construct estimates of CoI for a plausible set of interventions for which there is compelling evidence of their impact on stunting between birth and 36 months.^{1,2} Based on country-level data on benefits and costs, we estimate that the CoI that reduce stunting inequalities in 11 high-burden countries in Sub-Saharan Africa and South Asia range from 0.5 percentage points of GDP (Madagascar) to 5.7 percentage points (India) with a median value of 1.6 (Nigeria).

1. Introduction

The nutritional status of children has a direct impact on economic development through increased labor productivities and decreased risks of diseases when they become adults (see Hoddinott et al.³ for a comprehensive review of the evidence). Still, even though undernutrition entails significant losses in the economic potential of countries, it does not receive the urgent policy attention it needs.

Stunting is a common measure of long-run nutritional status. A child is stunted when his or her height-for-age z-score is more than two standard deviations below the age-sex median for a well-nourished reference population.⁴ Black et al. estimate that 165 million children in low and middle-income countries were stunted in 2011.⁵ The majority of stunted children (94%) live in Asia and Africa, with Asia accounting for almost 65% of world stunting, although the prevalence rate is lower than in Africa (28% versus 35%).⁶

Reducing stunting has economic benefits and costs. While costs of programs are immediate and relatively easy to quantify, benefits are more difficult to monetize in part because they occur over the individual life cycle.^a Fortunately, there is a rich literature that identifies a set of cost-effective interventions aimed at reducing stunting. The aim of this paper is then to estimate the cost that society pays for not undertaking these evidence-based stunting-reduction interventions. We refer to this cost as the Cost of Inaction (CoI). The CoI therefore reflects the net benefits foregone for not taking an action.^b The CoI reflects both the benefit-cost ratios where action is taken and the size of the uncovered population if action is not taken. It is not a substitute for benefit-cost ratios for marginal decisions.

In particular, we estimate the Cost of Inaction (CoI) for closing gaps in stunting prevalence for 0-24 months-old children due to socioeconomic differences within countries in a group of 11 high-burden countries in Sub-Saharan Africa and South Asia, the two regions that have the largest share of world stunting. We focus on closing these within-country gaps because from an equality of opportunities perspective, the probability of children being stunted should not be correlated with circumstances that are beyond individuals' control, such as parental background or wealth; further most policies that directly affect child nutritional status are undertaken at a country level.⁷ We also simulate the CoI for reducing stunting to a 15% prevalence rate in all of these 11 countries.^c

^a Benefits can be estimated following different approaches, as will be seen in section 5.

^b Besides productivity, undernutrition also has long-term effects on a person's health and education. These costs, beyond the extent to which undernutrition works through health and education to affect productivity, are not accounted for in this paper. This probably leads to us underestimating the CoI.

^c Simulations for reducing stunting to zero, independently of children's nationality, are available from the authors upon request.

The rest of this article is organized as follows. Section 2 presents the conceptual framework of CoI. Section 3 discusses other related studies. Section 4 presents descriptive statistics. Section 5 presents the methodology and results. Section 6 concludes.

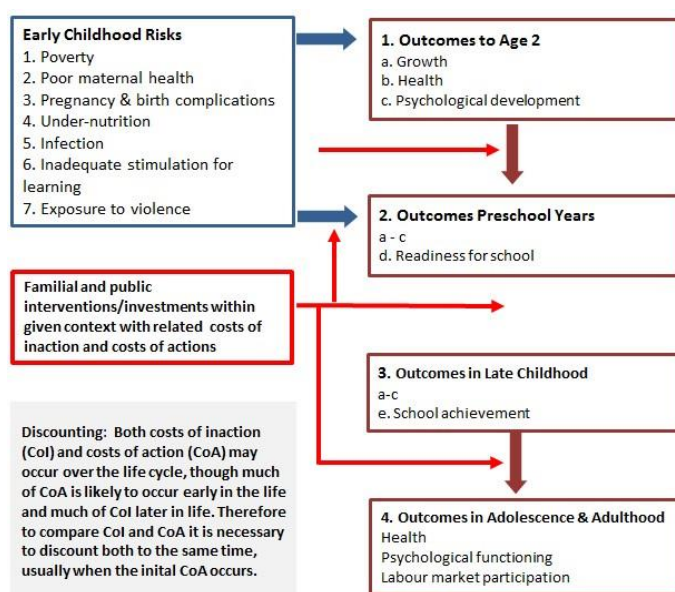
2. Conceptual framework

CoI are opportunities foregone or costs incurred due to failure to undertake particular early childhood development (ECD) interventions. CoI have numerous components: some are fairly immediate (e.g., additional resource costs for treatment of higher child morbidity in absence of an intervention) and others are in the future (e.g. foregone increases in adult productivities decades later in absence of an early childhood intervention). Figure 1 provides a life-cycle framework to illustrate the CoI to mitigate risks in early childhood. The upper blue box lists risks that preschool-age children face. These risks, possibly mitigated by familial and public interventions/investments (red arrows from the red box), affect preschool-age child developments in various domains. These preschool-age outcomes, again modified by familial and public interventions/investments, affect outcomes in late childhood, which provide the foundation for outcomes in adolescence, and, in turn, adulthood and old age.

Within this framework, familial and public interventions in preschool ages can mitigate preschool-age risks and thus increase productivities and improve health and other outcomes over the life cycle (e.g., crime, parenting), some of which may have intergenerational effects. CoI are foregone opportunities for these gains due to failure to undertake these interventions. Some important implications of this framework include:

1. **CoI are borne throughout the life cycle.** To estimate CoI, multiple dimensions of CoI must be incorporated over decades. Moreover, in addition to important concurrent interactions so that, for example, CoI to remedy inadequate stimulation may exacerbate CoI to remedy malnutrition, dynamic complementarities may be important, with negative effects of poor preschool-age outcomes on CoI in later life-cycle stages. But to obtain the total CoI it also is important to not double count. For example if one important CoI is less adult productivities or more crime because of less schooling, to calculate the total CoI the effect of less schooling in so far as it is a channel that affects adult productivities should not be added in addition to less adult productivities and more crime.
2. **Families and other entities are likely to respond to an ECD intervention, and their responses may change in either direction the CoI.** If families reinforce or compensate what they perceive to be impacts of an ECD intervention on their children, those responses should be incorporated in the estimation of the CoI.
3. **To obtain the total CoI, it is necessary to put different impacts into the same units (e.g., monetary values).** For some dimensions of CoI, this is fairly easy – e.g., monetary values of lost productivity in labor markets. For other dimensions, it is more challenging to assess monetary values. The leading example probably is premature mortality because estimates for the value of averting mortality range widely.

Figure 1: Costs of Inaction (CoI) and Cost of Action (CoA) within Life Cycle Framework



Source: Drawn by Authors.

4. **Because the CoI are experienced over decades, they should be discounted.** A CoI of a given value (e.g., 10,000 dollars) that occurs in early life has a greater present discounted value (PDV) than a CoI of the same nominal value (10,000 dollars) decades later because in the interim the resources could be reinvested. Therefore PDVs of CoI are needed to compare CoI at different points in time. The choice of discount rates is important for CoI that occur later in the life cycle: the PDV of a \$1,000 CoI experienced 50 years in the future is \$228.11 with a 3% discount rate, \$87.20 with 5%, and \$3.28 with 10%. Typically discount rates of 3-6% are used for social sectors.^{8,3,d} We consider two time lapses for the calculation of benefits, 15 and 30 years from the age of entering the labor market. As in Hoddinott et al.³ and Horton and Hoddinott,⁹ we assume that benefits occur until the ages 36 and 51, respectively.^e
5. **CoI, even with discounting, may be largely from impacts in adulthood rather than childhood.** Alderman and Behrman¹⁰ estimate that the costs of not moving an infant from low birth weight to normal birth weight status at a 5% discount rate are accounted primarily (57%) by costs due to reduced adult productivity two-to-six decades later. To estimate CoI of a new ECD intervention therefore it probably is essential to link estimates of relations among outcomes over the life cycle because the CoI for new interventions will not be revealed in actual experience for several decades.
6. **Because of assumptions necessary to estimate CoI, it is important to examine how robust are estimates to alternative assumptions regarding critical components of such calculations such as discount rates and benefit-cost ratios.** These assumptions are considerable for a number of reasons. For example, many of the estimates of costs and impacts are based on small studies, not nationwide interventions, and there may be considerable challenges in scaling them up without reducing significantly benefit-cost ratios (see Figure 4 for a simulation). Also there are considerable challenges in estimating the impacts, particularly those that occur after considerable lags. Further,

^d In addition to discounting because of the time that elapses before some aspects of CoI are realized, because the childhood interventions are embodied in individual children, the CoI could be discounted for survival rates. For example, among children who survive to age 5 years, the percentages who survive to age 50 years are 93% in Brazil, 89% in India, and 73% in Nigeria (calculated from WHO life tables at www.who.int/countries, accessed 17-1-2015). Therefore CoI that occur around age 50 years such as increased prime-age adult productivities could be adjusted for such survival probabilities. We have not done so; to do so would reduce the CoI somewhat.

^e It is worth mentioning that extending the time horizon for benefits implies a set of assumptions that are stronger the longer the time horizon. The higher the discount rate is, the less relevant is the inclusion of more distant years.

the estimates are context-specific and contexts are likely to vary importantly (e.g., with regard to prices, resources, preferences, macro economic conditions) across space and over time. Finally, our estimates do not adjust for possible general equilibrium effects on returns to more-skilled workers, which may work in either direction depending on the induced shifts in supplies of and demands for such workers.

7. **Actions also have costs.** Therefore CoI should be net of the costs of action, including initial resource costs for interventions and subsequent costs (e.g., if early-life actions induce more schooling, with concomitant resource costs, these should be incorporated into resource costs in the benefit-cost (BC) ratios used below).

3. Background

In this section we briefly discuss other related studies. Hoddinott et al.³ analyze the economic rationale for investing in reducing stunting in children under 24 months old. They take costs from Bhutta et al.¹ and Bhutta et al.² and calculate benefits associated with effective nutritional interventions in order to obtain benefit-cost ratios. We used their estimates of country-specific benefit-cost ratios as an input in our calculation of the CoI.

The Global health 2035: a world converging within a generation publication¹¹ does yet a different type of exercise (convergence between low and high- income countries) as well as a different set of interventions (for maternal and child health, and HIV and malaria control). The paper estimates that across 34 low-income countries, the costs are estimated to be an additional US\$23 billion per year from 2016 to 2025. Most of these incremental costs are health systems costs, which account for 70% of all costs in the first 10 years and 60% in the second 10 years. With a full income approach to estimating the economic benefits of convergence, the benefits would exceed costs by a factor of about 9 (i.e. a benefit-cost ratio of 9:1).

An important ongoing study is the Cost of Hunger in Africa (COHA),¹² a multi-country project aimed at estimating the economic impacts of child undernutrition in Africa on health, education and productivity. They find that the annual losses (that summarize costs to health, education and productivity) in terms of the outcomes mentioned above are equivalent to 1.9% of GDP for Egypt, 16.5% of GDP in Ethiopia, 3.1% in Swaziland and 5.6% in Uganda.^f

4. GDP, social expenditure and socioeconomic gaps in stunting

Based on information availability on benefit-cost ratios,³ costs^{1,2} and stunting prevalence by wealth based on the most recent Demographic and Health Surveys we selected 11 high burden Sub-Saharan Africa and South Asian countries. Table 1 presents basic macroeconomic indicators for the 11 countries in our final sample.

Table 1: Basic Economic Indicators for selected countries

Region	Country	GDP per capita (US\$)	Population in millions (% rural)	Governmental Expenditures (% GDP)	Expenditure by sector (% GDP)	
					Education	Health
Sub-Saharan Africa	DRC	484.2	67.5 (59)	8.4	2.5	2.9
	Madagascar	463.0	22.9 (66)	9.7	2.8	2.5
	Ethiopia	505.0	94.1 (81)	10.6	4.7	1.8
	Uganda	572.0	37.6 (85)	19.0	3.2	1.9
	Tanzania	694.8	49.3 (70)	23.3	6.2	2.8
	Kenya	1,245.5	44.4 (75)	18.3	6.7	1.8
	Nigeria	3,005.5	173.6 (54)	6.0	-	1.9
South Asia	Nepal	694.1	27.8 (82)	15.9	4.7	2.2
	Bangladesh	957.8	156.6 (67)	9.8	-	1.2
	Pakistan	1,275.3	182.1 (62)	17.6	2.2	1.0
	India	1,498.9	1,252.1(68)	14.0	3.4	1.3

Source: The World Bank¹³ circa 2011

As shown in Table 1, countries included in our analysis vary in population size, economic development and public expenditures as percentage of GDP.

^f These were the four countries participating in the first phase of the study, for which results are available.

However, stunting prevalence is high in all of these countries. We used the most recent available Demographic and Health Survey (DHS) data for each country to calculate stunting rates in children under 2 years old. Results by wealth quintiles are presented in Table 2.

Average rates are above 40% in India and Madagascar. Also, in our data stunting prevalence is highly correlated with wealth status in all countries, although gaps vary across countries. For instance, the gap between the poorest quintile (Q1) and the richest quintile (Q5) is particularly high in Pakistan (36 percentage points), in Nepal (30 pp) in Nigeria and India (28 pp) and much lower in Madagascar (1 pp) and Uganda (3.4 pp).

Table 2: Prevalence of stunting by wealth quintiles (%). Children under 24 months

Region	Country	Quintile					Total	Year of survey
		1	2	3	4	5		
Sub-Saharan Africa	DRC	33.5	31.2	29.5	32.2	15.7	28.9	2013/4
	Madagascar	40.6	45.2	41.4	48.4	39.6	43.0	2008/9
	Ethiopia	36.3	32.1	32.7	28.1	19.7	30.6	2011
	Uganda	27.2	23.1	35.8	27.6	23.8	27.5	2011
	Tanzania	43.3	37.8	37.1	34.1	26.7	36.6	2010
	Kenya	40.0	39.3	30.9	29.9	23.7	33.3	2008/9
	Nigeria	44.3	35.9	27.9	22.2	16.0	30.0	2013
South Asia	Nepal	40.8	35.4	26.8	15.1	10.6	27.5	2011
	Bangladesh	46.3	39.2	33.8	31.8	23.6	35.4	2011
	Pakistan	59.4	45.6	29.7	32.0	23.1	37.6	2012
	India	50.6	44.4	40.8	34.0	22.6	40.1	2005/6

Source: Authors' calculations based on Demographic and Health Survey (DHS). Notes: Quintiles are based on DHS Wealth Index. The height-for-age z scores (HAZ) were calculated using the new Child Growth Standards released by the World Health Organization.⁴

5. Methodology for estimation of CoIs for stunting reduction in 0-2 year-olds

We calculate the CoI of different interventions as the difference between the benefits and the budgetary costs of interventions.^g To estimate the benefits we rely upon benefits-cost ratios (r) estimated in Hoddinott et al.³ The value of r in each country was obtained assuming an i percent increase in per capita income of those affected by the intervention during their first t years in the labor market. The increase in income as a consequence of the intervention is discounted at a rate d to obtain the present value. Then, the present value of increased income is divided by the average cost of the intervention. Therefore, as stated in equation (1), the benefit-cost ratio is a function of parameters involved in the simulation such as the span of time considered, the discount rate used, the projected per capita income, the proportional income increase, the ages at which children enter the labor market and at which they leave the labor market (or, for whatever reasons, we terminate the time horizon of interest), and the costs of the intervention.

$$r^X = f(i, t, d, c) = \frac{\sum_{j=a}^{t+a} \frac{PCT_j^X \times i}{(1+d)^j}}{c^X} \quad (1)$$

Where PCT_j^X is the projected per capita income in the country X in the j th year since the intervention, a is the age at which children affected by the program today enter the labor market (we assume it is 21), t is the span of time in which we measure benefits, i is the expected percentage increase in income due to the participation in the program, c^X is the average cost of the program in the country X and d is the discount rate. The higher the impact of the intervention i and the longer the time span considered t , the higher is the expected r . On the other hand, the higher the discount rate and the average cost c , the lower is the expected benefit-cost ratio. As r is sensitive to the value assumed for the parameters in the simulation, we use different benefit-cost ratios calculated for a different set of values of the parameters as a robustness check.

^g We assume that the budgetary costs are the total real costs of the intervention. If in addition there are private costs (e.g., time costs for mothers, fees, transportation costs), then ceteris paribus our estimates overstate the CoI. On the other hand if the budgetary costs include transfers in addition to real costs (e.g., as for conditional cash transfer programs), ceteris paribus the budgetary costs overstate the real resource costs.

We calculate the CoI of a particular intervention in each country subtracting total costs from total benefits in present value terms for one birth cohort, every two years (given that children “graduate” from programs at age 2). As r is interpreted as the economic returns generated by every dollar invested in reducing stunting through interventions, total benefits are calculated by multiplying $r(\cdot)$ by the total investment in the program (average cost c by the number of children in the intervention).

$$CoI = N \times c \times (r(\cdot) - 1) \quad (2)$$

We present the CoI for different kinds of interventions. In the first place, we evaluate the CoI for closing gaps in stunting prevalence between the first-fourth wealth quintiles and the fifth (richest) quintile (see Table 2). To do so, we need to estimate N in equation (2), i.e. the number of children under 2 years old who would need to “be moved” from stunted to not stunted in each country in order for the rates in the first four quintiles to be changed to the one of Q5. We use DHS data to calculate N according to equation (3):

$$N = \{(s_5 - s_1)n_1 + (s_5 - s_2)n_2 + (s_5 - s_3)n_3 + (s_5 - s_4)n_4\} \times N^T \quad (3)$$

Where s_w ($w=1, 2, \dots, 5$) is the stunting prevalence in wealth quintile w ; n_w is the share of children under two years old in quintile w and N^T is the total number of children under two in the country.^h Table 3 presents the total number of children in each country who are included in the intervention under this scenario. Demographic factors such as population size and the magnitude of gaps among quintiles determine the scale of the intervention in each country.

Table 3: Number of children affected to close gaps (*) (in millions)

Region	Country	N
Sub-Saharan Africa	DRC	0.66
	Madagascar	0.05
	Uganda	0.10
	Kenya	0.26
	Tanzania	0.33
	Ethiopia	0.71
	Nigeria	1.71
	Bangladesh	0.82
South Asia	India	8.32
	Nepal	0.21
	Pakistan	1.31

(*)Number of Q1, Q2, Q3, and Q4 children who should be receiving the set of interventions to close all the stunting gap with Q5. Source: Authors’ calculations based on Demographic and Health Surveys (DHS).

Figure 2 presents the CoI for closing gaps in each country. Benefit-cost ratios were calculated using the average cost of interventions (c in equation 1) presented in the last column of Table A.1 in the Appendix.² These evidence-based interventions include those that improve the health and nutrition of mothers; those aimed at improving care behaviors; interventions that address health-related causes of undernutrition and interventions that improve the quality and quantity of children’s diet. Also, based on estimations of Hoddinott et al.,³ the impact of these interventions on income (i in equation 1) was assumed to be 11.3% and therefore the benefit-cost ratios are in Columns I to IV of Table 1. We present the CoI for 3% and 6% discount rates and for 15 and 30 years of participation in the labor market (i.e time span).

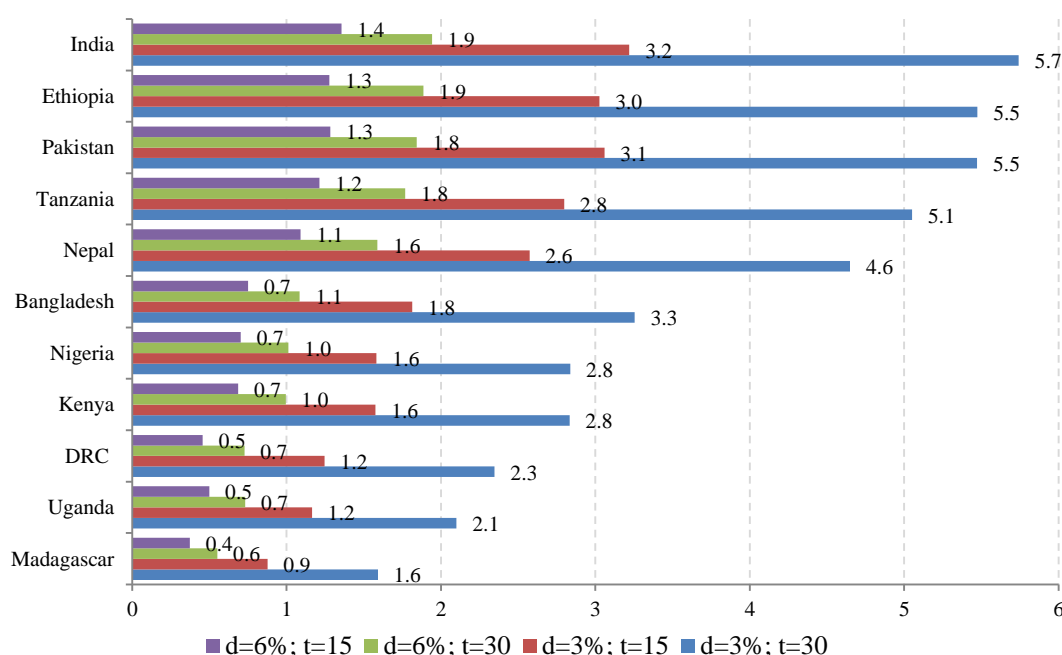
^h For example, if the gap in stunting prevalence between Q1 and Q5 (i.e., s_5-s_1) were 15% and the proportion of children under two that live in households in Q1 (i.e. n_1) were 22%, then 3.2% (i.e. 15% times 22%) of the total number of children in that age group will need to be affected by the intervention.

The CoI for closing gaps vary across countries because of differences in the size of the intervention due to different stunting rates and population sizes under two years old (i.e. N , the number of children), the projected per capita income in each country and some differences in cost of interventions (see tables 3 and A.1). CoI also varies within each country depending on the values assumed for d and t . It goes from about half of one percentage point of GDP for Madagascar with the more conservative combination of parameters to more than five and a half percentage points of GDP for India with the lowest discount rate and longer period considered. Table A.2 in the Appendix presents the same results both in US\$ and as a % of GDP.

Alternative simulation: We analyze now a new target and calculate the CoI to reach an average prevalence rate of 15% in each country. Figure 3 presents the results for this simulation. In the calculations we used the same parameters as in Figure 2 regarding impacts and costs of intervention. We also present the results using different discount rates and time spans. CoI are significantly higher in this scenario because for every country with the exception of Nepal the prevalence of stunting in Q5 is higher than 15%, so it is easier to move all children to the Q5 prevalence than to 15%.ⁱ The CoI increases to more than 10% of GDP in Madagascar and Tanzania in the less conservative combination of t and d while it remains below 3% of GDP for the Democratic Republic of Congo and Nigeria. Table A.4 in the Appendix presents the same results both in US\$ and as a % of GDP.

The ordering of countries in Figure 3 is not the same as in Figure 2, suggesting that some countries like India face higher cost for inequality of opportunities than others.

Figure 2: Cost of Inaction for closing gaps. % GDP



6. Conclusions

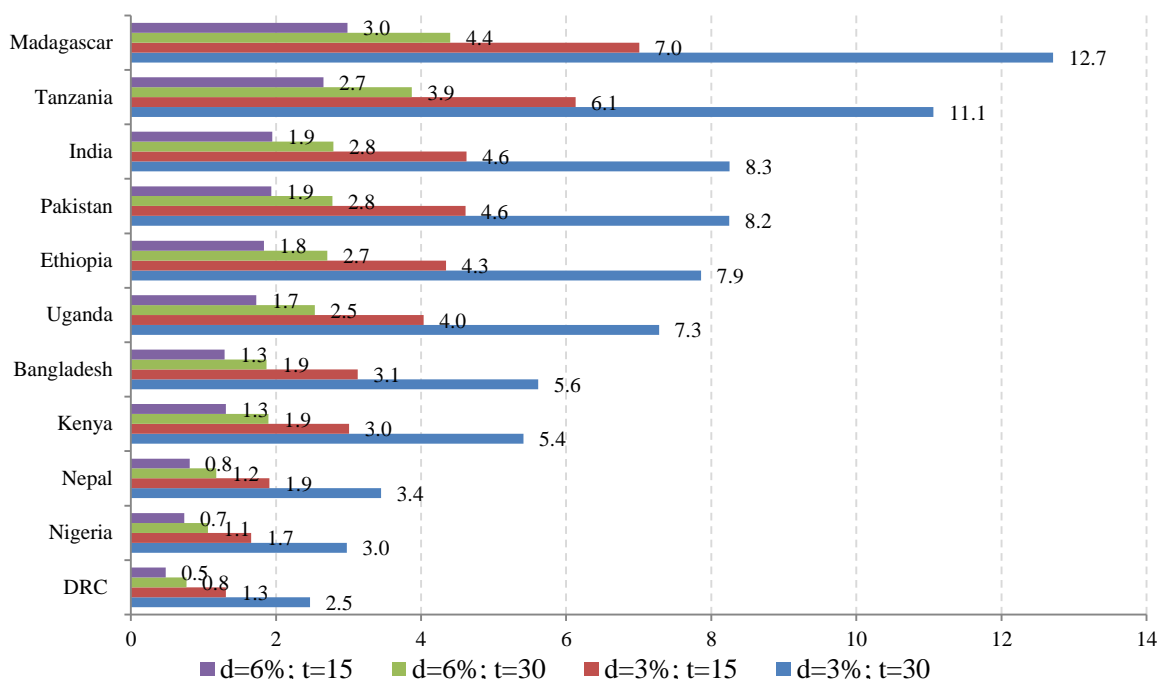
We have estimated the CoI for closing gaps between the first four wealth quintiles and the fifth in the prevalence of stunting in children less than 2 years of age in 11 Sub-Saharan and South Asian countries that all have high prevalence rates but that vary considerably in a number of other dimensions. These countries have data on benefits

ⁱ The number of children in the intervention for this scenario in each country is presented in Table A.3 in the Appendix.

and costs of for evidence-based stunting reduction interventions. We also calculate the CoI for reducing stunting to 15% in all countries.

To explore the robustness of different scenarios, we used two discount rates (3% and 6%) and two time frame periods (15 and 30 years) and found that the median CoI among these 11 countries is 1.9% of GDP (India) for reducing the prevalence of stunting of all children to 15%. These CoIs are quite high, suggesting that the costs of not undertaking such interventions are considerable. The ranges of the CoI across these 11 countries also are considerable – from 0.4% (Madagascar) to 1.4% (India) of GDP for lowering the prevalence rate of the bottom four quintiles to that of the fifth and 0.5% (DRC) to 3% of GDP (Madagascar) for lowering the prevalence rate of all quintiles to 15%, in the most conservative scenario (15

Figure 3: Cost of inaction for 15% stunting. %GDP



years in the labor market and 6% discount rate). The underlying differences in the stunting prevalence rates across quintiles, the estimated benefits and the estimated costs of action thus result in considerable heterogeneity across these countries in the extent of opportunities missed by not reducing stunting to the degree being simulated.

As discussed above, there is considerable uncertainty about our CoI estimates. Therefore we have explored what happens if the benefit-costs ratios were smaller than those found in the cited literature due, for example, to reduced benefits and increased costs of scaling-up. On the other hand, BC ratios may be greater than those in the cited literature because of some conservative dimensions of our assumptions, such as ignoring some nonmarket benefits. Figure 4 illustrates how the CoI relates to benefit-cost ratios for the countries considered. Clearly the estimated CoI is sensitive to the assumptions underlying the benefit-cost ratios. For most countries, the COI is considerable for a range of benefit-cost ratios around the ones used in the base simulations.

To guide the interested reader in how the calculations were performed we provide a numerical example below for the case of the CoI for DRC for not attaining 15% stunting (using a discount rate of 3% and a time span of 15 years)

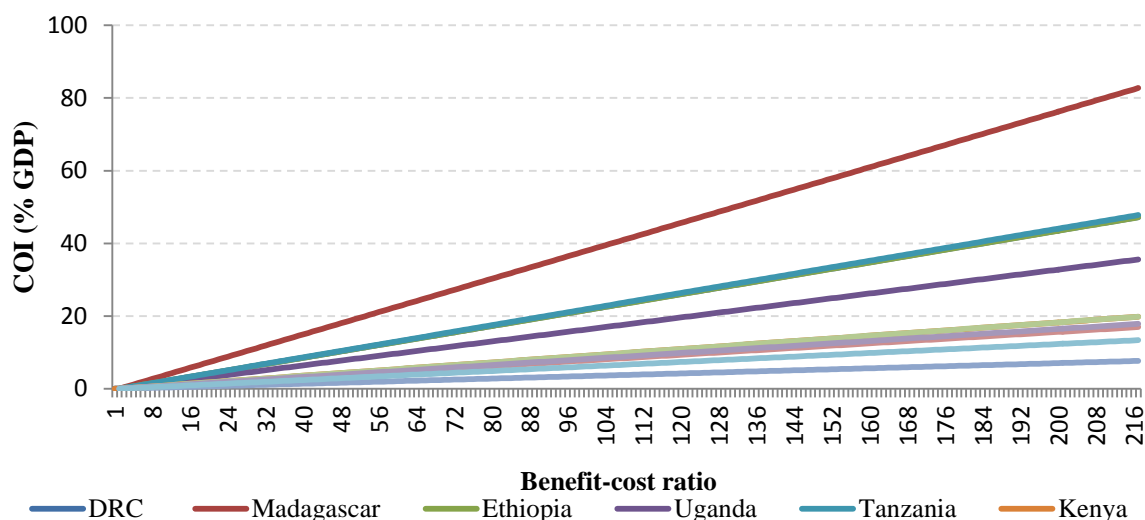
Simulation	Country	N	c	r	COI (in millions)	COI (% of GDP)
Stunting 15%, d=3%	DRC	0.697	102.5	7	429	1.3

Where N is the number of children affected by the intervention in millions (here 697 thousands, or 0.7 million as indicated in Table A.3), c is the cost of the intervention (here 102.5 US\$/child/year as indicated in Table A1), r is the BC ratio (here equals 7 as indicated in Table A.1).

As per re-arranging terms in equation (2) the CoI is: $N \times c \times r(\cdot) - N \times c$; or $0.697 \times 102.5 \times 7 - 0.697 \times 102.5 = 429$ million dollars

By dividing this figure by the GDP of DRC, we obtain the 1.3% of GDP (see Table A.4).

Figure 4: Cost of inaction (in %GDP) as a function of BC ratios, for reducing stunting to 15%.



These estimates may be conservative because we only consider productivity effects but there may be in addition other effects such as improved health, parenting and reduced crime. We also use 15 years of participation in the labor market, when in many countries labor market participation can last 40 years or more. Also, our target is at closing SES gaps within-countries to acknowledge heterogeneity across countries. Therefore, as children in our simulations are reaching their “country-specific” potential (the outcomes of children in the 5th quintile), our estimates are much smaller than those that simulate the complete elimination of stunting. On the other hand, we assumed 3% and 6% discount rates, which are low compared to the discount rates used for physical capital investments (usually at least 10-12%). We also did not adjust for survival probabilities, which probably biases upward our estimated CoI. And, finally, these estimates are subject to considerable uncertainties because of the assumptions discussed above needed to undertake them.

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Appendix

Table A.1: Benefit-Cost ratios and average cost of action per child

Region	Country	Benefit-cost ratios				Cost based on Bhutta et al. (2013)
		d=3%		d=6%		
		t=15	t=30	t=15	t=30	
Sub-Saharan Africa	DRC	7.0	12.3	3.2	4.5	102.5
	Ethiopia	20.9	37.0	9.4	13.4	102.5
	Kenya	33.8	60.0	15.3	21.7	102.5
	Madagascar	19.3	34.2	8.8	12.5	103.0
	Nigeria	47.8	84.9	21.8	30.9	103.0
	Tanzania	28.7	51.0	13.0	18.5	102.5
	Uganda	25.5	45.2	11.5	16.4	102.5
	Bangladesh	35.1	62.2	15.1	21.4	97.1
South Asia	India	75.8	134.4	32.5	46.1	97.1
	Nepal	25.3	44.9	11.3	16.0	97.1
	Pakistan	56.8	100.8	24.4	34.6	97.1

Note: The costs of interventions are based on the 10 stunting reduction interventions listed in Table 1 of Hoddinott et al.³ Source: Hoddinott et al. (2013) and Bhutta et al.(2013).

Table A.2: Cost of Inaction for closing gaps

Region	Country	Millions US\$				%GDP			
Sub-Saharan Africa	DRC	407	767	149	238	1.2	2.3	0.5	0.7
	Ethiopia	1,438	2,602	607	896	3.0	5.5	1.3	1.9
	Kenya	870	1,565	379	549	1.6	2.8	0.7	1.0
	Madagascar	93	169	40	59	0.9	1.6	0.4	0.6
	Nigeria	8,257	14,803	3,670	5,275	1.6	2.8	0.7	1.0
	Tanzania	930	1,678	403	587	2.8	5.1	1.2	1.8
	Uganda	250	451	107	157	1.2	2.1	0.5	0.7
	Bangladesh	2,720	4,882	1,125	1,627	1.8	3.3	0.7	1.1
South Asia	India	60,428	107,768	25,448	36,434	3.2	5.7	1.4	1.9
	Nepal	497	897	211	307	2.6	4.6	1.1	1.6
	Pakistan	7,107	12,711	2,980	4,280	3.1	5.5	1.3	1.8
Time span (t)		15	30	15	30	15	30	15	30
Discount rate (d)		3%	3%	6%	6%	3%	3%	6%	6%

Source: Authors' calculations based on Hoddinott et al. (2013).

Table A.3: Number of children affected (in millions). Stunting 15%

Country	t
DRC	0.7
Madagascar	0.3
Ethiopia	1.0
Uganda	0.3
Tanzania	0.7
Kenya	0.4
Nigeria	1.8
Nepal	0.1
Bangladesh	1.4
Pakistan	1.9
India	11.96

Source: Authors' calculations based on Demographic and Health Survey (DHS).

Table A.4: Cost of Inaction for 15% stunting

Region	Country	Millions US\$				% GDP			
Sub-Saharan Africa	DRC	429	807	157	250	1.3	2.5	0.5	0.8
	Ethiopia	2,065	3,736	872	1,287	4.3	7.9	1.8	2.7
	Kenya	1,661	2,988	724	1,049	3.0	5.4	1.3	1.9
	Madagascar	744	1,349	317	467	7.0	12.7	3.0	4.4
	Nigeria	8,661	15,528	3,850	5,534	1.7	3.0	0.7	1.1
	Tanzania	2,036	3,676	882	1,286	6.1	11.1	2.7	3.9
	Uganda	867	1,565	372	545	4.0	7.3	1.7	2.5
	Bangladesh	4,693	8,423	1,941	2,808	3.1	5.6	1.3	1.9
South Asia	India	86,859	154,906	36,578	52,371	4.6	8.3	1.9	2.8
Asia	Nepal	368	665	156	227	1.9	3.4	0.8	1.2
	Pakistan	10,711	19,157	4,492	6,450	4.6	8.2	1.9	2.8
Time span (t)		15	30	15	30	15	30	15	30
Discount rate (d)		3%	3%	6%	6%	3%	3%	6%	6%

Source: Authors' calculations based on Hoddinott et al (2013).

Web Appendix 12:

The Cost of Inaction in Early Childhood Interventions in Latin America and the Caribbean

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Abstract

The study assesses the cost of inaction (CoI) for reducing socio-economic status (SES) inequities in preschool enrolment rates and receptive language development for children 3 to 5 years old based on careful micro studies in six Latin American countries. We construct estimates of CoI for two interventions for which there is compelling evidence of their impact on child development: preschool and home visits. Based on country-level data, we estimate that the CoI range from less than 0.1% of GDP for Chile to more than 4% of GDP in Nicaragua.

1. Introduction

The literature has established that the economic returns to certain investments in early childhood in a number of developed and developing countries are high.¹⁻⁵ Moreover, elective child development policies could prevent the deepening of socioeconomic gaps between the poor and the rich in a diverse set of outcomes. For instance, Engle et al.⁶ simulate benefit-cost ratios from 6.4 to 17.6 for reducing preschool enrolment gaps across wealth quintiles in 73 low- and middle-income countries with the benefits measured in terms of future expected wage gains due to increased schooling induced by higher preschool enrolments. Early childhood interventions include a set of actions addressing different domains of child development, including health, nutrition, cognitive, language, socio-emotional, and motor development (gross and fine), among others. These policies complement each other and need to be coordinated adequately.

In the last twenty years, Latin American and the Caribbean (LAC) countries have made remarkable progress in terms of infant mortality rates and malnutrition.^{7,a} However, they still face substantial challenges in some other critical dimensions of child development. Unfortunately, data on a number of important dimensions of child development—including cognitive, language, socio-emotional, and motor development—have not been collected for nationally-representative samples of children, in a way that is comparable across countries, and available at more than one point in time. Socioeconomic gradients in the region are steepest in language and cognitive development,⁸ and much less apparent for other outcomes, including socio-emotional development and the incidence of behavioral problems.

In this paper we estimate the cost of inaction (CoI) for closing socioeconomic gaps in two different early childhood interventions that the evidence has shown to be effective for addressing language and cognitive development: preschool (via a direct effect on child development) and stimulation home visits (via changing parental stimulation behaviors). The CoI are the benefits forgone by not having made investments in childhood development. The CoI reflects both the benefit-cost ratios were action taken and the size of the uncovered population if action is not taken. It is not a substitute for benefit-cost ratios for marginal decisions. The socioeconomic gaps are defined as the differences in coverage in preschool or in a receptive vocabulary test by wealth quintiles, parallel to the analysis in Engle et al.⁶ We analyze six LAC countries: Chile, Colombia, Guatemala, Ecuador, Peru and Nicaragua, which have data available for both benefits and costs of these two interventions. We also estimate the CoI for eliminating delays in receptive language. To estimate parameters for our CoI estimates we use careful micro estimates of the relevant parameters for each country rather than broad averages across countries in aggregate cross-country studies (e.g., the assumed preschool enrolment-schooling

^a Over a fifty-year period, 15 of the 17 countries in the region with available data reduced infant mortality rates (IMR) by 75 percent or more; three countries, Brazil, Chile, and Peru, reduced IMR by 90 percent or more. Over a twenty-year period, stunting fell by approximately 50% in Brazil, Colombia, Dominican Republic, El Salvador, Haiti, Honduras, Jamaica, Paraguay, Peru, and Uruguay, and by more than 75 percent in Mexico. Most countries in the region now have stunting rates that are roughly comparable to, or substantially lower than, those found in other countries with similar income levels.

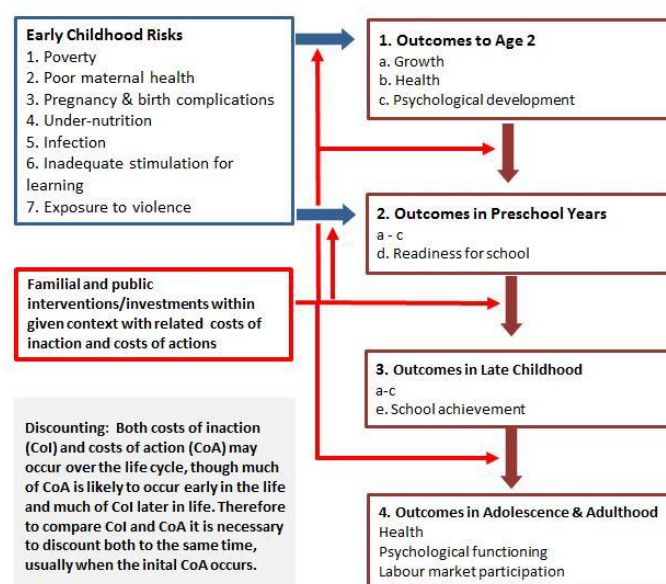
attainment–wage relations in Engle et al.).⁶ Therefore we obtain estimates that are much more rooted in the realities of the countries that we consider, at the cost of covering many fewer countries than in cross–country studies using aggregate data.

This paper is organized as follows. Section 2 describes the conceptual framework and key concepts involved in the calculation of CoI. Section 3 briefly presents the countries included in the study and the data on preschool coverage and receptive language outcomes for each country. Section 4 describes the methodology behind CoI calculations and presents main results and robustness checks. Finally, section 5 concludes.

2. Conceptual framework and key concepts

Cost of Inaction (CoI) for early childhood development (ECD) interventions can be thought of as the opportunities or benefits foregone due to failure to undertake particular ECD interventions. CoI have numerous components: some are fairly immediate but most occur in the future, as childhood development is an important driver of adult outcomes in a number of domains. In particular, adult productivities decades later could be affected by absence of an early childhood interventions. Figure 1 provides a life–cycle framework to illustrate the CoI to mitigate risks in early childhood. The upper blue box lists risks that preschool–age^b children face. These risks, possibly mitigated by familial and public interventions/investments (red arrows from the red box), affect preschool–age child development in various ways. These preschool–age outcomes, again modified by familial and public interventions/investments, affect outcomes in the next stage (late childhood), which provide the foundation for outcomes in adolescence, and, in turn, adulthood and old age.

Figure 1: Costs of Inaction (CoI) and Cost of Action (CoA) within Life Cycle Framework



Source: Drawn by Authors.

Within this framework, familial and public interventions in preschool ages can mitigate preschool–age risks and thus increase productivities and improve health and other outcomes over the life cycle (e.g., crime, parenting) some of which may have intergenerational effects. CoI are foregone opportunities for these gains due to failure to undertake these interventions. Some important implications of this framework include:

1. **CoI are borne throughout the life cycle.** To estimate CoI, multiple dimensions of CoI must be incorporated over decades. Moreover, in addition to important concurrent interactions so that, for example, CoI to remedy inadequate stimulation may exacerbate CoI to remedy malnutrition, dynamic complementarities may be important, with negative effects of poor preschool–age outcomes on CoI in later life–cycle stages. But to obtain the total CoI it also is important to not double count. For example if one important CoI is less adult productivities or more crime because of less schooling, to calculate the

^b “Preschool age” here means the entire period from conception to the initiation of school, not just the ages in which preschool programs such as those mentioned below are usually concentrated (i.e., 3–5 years of age).

total CoI the effect of less schooling in so far as it is a channel that affects adult productivities should not be added in addition to less adult productivities and more crime.

2. **Families and other entities are likely to respond to an ECD intervention, and their responses may change in either direction the CoI.** If families reinforce or compensate what they perceive to be impacts of an ECD intervention on their children, those responses should be incorporated in the estimation of the CoI.
3. **To obtain the total CoI, it is necessary to put different impacts into the same units (e.g., monetary values).** For some dimensions of CoI, this is fairly easy –e.g., monetary values of lost productivity in labor markets. For other dimensions, it is more challenging to assess monetary values. The leading example probably is premature mortality because estimates for the value of averting mortality range widely.
4. **Because the CoI are experienced over decades, they should be discounted.** A CoI of a given value (e.g., 10,000 pesos) that occurs in early life has a greater present discounted value (PDV) than a CoI of the same nominal value (10,000 pesos) decades later because in the interim the resources could be reinvested. Therefore PDVs of CoI are needed to compare CoI at different points in time. The choice of discount rates is important for CoI that occur later in the life cycle: the PDV of a 1,000 dollars CoI experienced 50 years in the future is 228.11 dollars with a 3% annual discount rate, 87.20 dollars with 5%, and \$8.52 with 10%. Typically discount rates of 3–6% are used for social sectors).^{6,9,3, c} Regarding the time horizon in which benefits (and CoI) occur, since we focused on productivities, we assume benefits occur from the age of entry into the labor market until age 60.^d
5. **CoI, even with discounting, may be largely from impacts in adulthood rather than childhood.** For example Alderman and Behrman,⁹ estimate that the costs of not moving an infant from low birth weight to normal birth weight status at a 5% discount rate are accounted primarily (57%) by costs due to reduced adult productivity two–to–six decades later. To estimate CoI of a new ECD intervention therefore it probably is essential to link estimates of relations among outcomes over the life cycle because the CoI for new interventions will not be revealed in actual experience for 5–6 decades.
6. **Because of assumptions necessary to estimate CoI, it is important to examine how robust are estimates to alternative assumptions regarding critical components of such calculations such as discount rates and benefit-cost ratios.** These assumptions are considerable for a number of reasons. For example, many of the estimates of costs and impacts are based on small studies, not nationwide interventions, and there may be considerable challenges in scaling them up without reducing significantly benefit-cost ratios (see simulation in Figure 4). Also there are considerable challenges in estimating the impacts, particularly those that occur after considerable lags. Further, the estimates are context-specific and contexts are likely to vary importantly (e.g., with regard to prices, resources, preferences, macro conditions) across space and over time. Finally, our estimates do not adjust for possible general equilibrium effects on returns to more-skilled workers, which may work in either direction depending on the induced shifts in supplies of and demands for such workers.
7. **Actions also have costs.** Therefore CoI should be net of the costs of action, including initial resource costs for interventions and subsequent costs (e.g., if early–life actions induce more schooling, with concomitant resource costs, these should be incorporated into resource costs in the benefit–cost (BC) ratios used below).

In this study we evaluate the CoI for two interventions: preschool and home visits. In particular, we are interested in the CoI for closing present gaps in socioeconomic gradients in preschool enrolment and childhood development outcomes for children 3 to 5 years old, a population for which data are available. The underlying rationale motivating these two different exercises is to reduce inequities in society. This paper then proposes: (i) reducing one measure of inequity in ECD *inputs* (inequities in coverage rates in preschool) through targeted preschool expansion that will then increase ECD *outcomes* such as test scores later in school, among others; and (ii) reducing a measure of inequity in ECD outcomes through targeted home visits. Given the budgetary constraints that governments usually have, we think of these two exercises as a menu of policy options.

^c In addition to discounting because of the time that elapses until all benefits are realized, the CoI could be discounted for survival rates. For example, among children who survive to age 5 years, the percentages who survive to age 50 years are 93% in Brazil, 89% in India, and 73% in Nigeria (calculated from WHO life tables at www.who.int/countries, accessed 17-1-2015). Therefore CoI that occur around age 50 years such as increased prime-age adult productivities could be adjusted for such survival probabilities. We have not made such adjustments, so our benefits may be overstated slightly (by less than 10%) given mortality rates in the countries studied (which are much more like Brazil than India or Nigeria).

^d It is worth mentioning that extending the time horizon for benefits out as far as age 50 or 60 years, requires a set of assumptions, such as how long people will stay actively engaged in the labour market, premature mortality rates, and incomes for the year 2075. The higher is the discount rate, the less relevant is the inclusion of more distant years.

Table 1 shows a summary of the evidence for LAC regarding the fact that preschool and home visits are successful at impacting academic achievement and cognition, respectively. Size effects for preschool are available from one study from Argentina and size effects for home visits range from 0.20 SD to 1.26 SD based on nine studies for four countries (Brazil, Colombia, Ecuador, Jamaica).

Table 1: Evidence on impact of preschool and home visits on cognitive skills/ achievement in LAC

Evaluation	Duration (Months)	Visits per month	Country	N	Cognitive skills effects
Preschool					
Berlinsnki et al. ¹⁰	12	NA	Argentina	117,515	0.24 (*)
Home visits					
Grantham–McGregor et al. ¹¹	36	3.6	Jamaica	39	1.26
Powell and Grantham–McGregor ¹² –weekly visits	24	4.3	Jamaica	58	1.15
Grantham–McGregor et al. ¹³	24	4.3	Jamaica	123	0.86
Rosero and Oosterbeek ¹⁴	21	4.3	Ecuador	1,473	0.55
Powell and Grantham–McGregor ¹² –bi-weekly visits	24	2.2	Jamaica	94	0.34
Powell and Grantham–McGregor ¹² –monthly visits	24	1	Jamaica	90	0.20
Eickmann et al. ¹⁵	5	2	Brazil	156	0.72
Gardner et al. ¹⁶	2	4.3	Jamaica	140	0.38
Attanasio et al. ¹⁷	18	4	Colombia	1,263	0.26

(*) The preschool effect is on Math and Spanish scores in 3rd grade of primary school.

3. GDP, social expenditure and socioeconomic gaps in ECD

In this study we calculate CoI for six LAC countries: Chile, Colombia, Ecuador, Guatemala, Nicaragua and Peru for which we have data on both preschool and receptive vocabulary gaps, as well as direct evidence on impacts and costs or reasonable proxies for them.^e Although they share some features common to the region, these countries are different in terms of population size, GDP and public social expenditure, among others. In this section we present some data on these variables for each country as a background for CoI comparison and interpretation. We also present evidence on the gaps in preschool coverage and receptive vocabulary in each country.

Table 2 shows that GDP per capita varies from US\$15,732 in Chile to US\$1,851 in Nicaragua, one of the poorest countries in the region (the average GDP for LAC countries is US\$9,621). Differences in population are important too and will affect, as we will see later, the estimated CoI for each country. Finally, social policy has evolved differently in each of these countries and the total amount of resources invested by governments in social sectors goes from 7.6% of GDP in Guatemala to 14.7% of GDP in Chile. Social expenditure tends to be concentrated in education, although countries like Chile and Colombia spend most of their public social sector resources in social protection.

Table 2: GDP per capita, population and social expenditure by country

Country	GDP per capita (US\$)	Population in millions (% rural)	Social Expenditure (% GDP)	Expenditure by main social sectors (% GDP)		
				Education	Health	Social protection
Chile	15,732	16.9 (11)	14.7	4.2	3.7	6.2
Colombia	7,831	44.7 (24)	13.7	3	1.9	7.4
Ecuador	6,003	15 (37)	8.3	4.7	1.8	1.4
Guatemala	3,478	13.8 (49)	7.6	3.2	1.1	1.6
Nicaragua	1,851	5.7 (42)	13	6	4.1	n/a
Peru	6,662	29.2 (22)	9.4	3.2	1.6	3.3

Source: The World Bank¹⁸ and CEPAL.¹⁹ Year 2012. Education includes preschool expenditures.

^e For instance, while in Table 1 we show data on impacts from preschool in Argentina, there is no literature reporting impacts from home visits there. And while there is such data on home visits from Jamaica, we do not have data on cost of preschool in that country.

LAC countries in the study also differ in preschool enrolment rates and early language development. Table 3 shows the average enrolment rate in preschool for 3 to 5 years old children by country. Whereas Ecuador is close to universal coverage for preschool (93%), in Guatemala less than a quarter of the population between 3 and 5 years old attend preschool (23.8%). Table 3 also disaggregates enrolment rates by wealth quintiles (Q1–Q5) in each country. A strong correlation between preschool coverage and socioeconomic status is present in all countries in the study. Some of them have quite heterogeneous associations with wealth quintiles, while others have more uniform distributions. For example, in Colombia the difference in enrolment rates between Q1 and Q5 is more than 40 percentage points (pp), while Chile and Ecuador have less than 10 pp differences between the richest and poorest quintiles.

Table 3: Gross preschool enrolment rates (percentages)

Wealth Quintile	Chile	Colombia	Guatemala	Ecuador	Peru	Nicaragua
1	68.8	37.8	15.4	89.5	61.9	32.5
2	72.1	43.3	16.4	90.8	67.3	37.5
3	69.4	50.6	23.3	90.0	78.4	38.1
4	74.3	61.1	30.6	98.0	87.5	38.3
5	78.0	78.5	42.6	99.2	90.5	48.5
Mean	72.0	51.2	23.8	93.0	75.2	38.3

Source SEDLAC (CEDLAS and The World Bank). Year 2011. Note: 3 to 5 years old.

Schady et al.⁸ present evidence on sharp differences in cognitive development by socioeconomic status in five of these LAC countries (all but Guatemala). Using the same data and extrapolating the TVIP delays from Nicaragua to Guatemala (see Table A.1 in the Appendix), we estimate for each country the percentage of children with delays defined by having a TVIP (Test Vocabulario en Imágenes Peabody) scores 1 or more standard deviations behind that of similarly-aged children in the reference population that was used to norm the test. Table 4 shows the results by wealth quartiles and urban/rural areas, for the countries for which information is available. Gaps in receptive vocabulary seem to vary not only by wealth quintiles, but also across countries. From Table 4 we can establish that: i) TVIP scores vary significantly across wealth quintiles within countries; ii) for countries where rural and urban data are available, rural areas tend to have a higher proportion of delayed children; iii) there are large differences across countries: for example, Nicaragua has on average 79.4% children with scores below 1 SD in the TVIP, while Chile has only 3.6% (rural areas) and 1.8% (urban areas) and iv) gaps in cognitive development between wealth groups are also different in each country. In Colombia and Ecuador (where one third of all children have delays of 1 standard deviations or more) and in rural Peru (where almost half of the children are delayed), the differences across quintiles are very large. On the other hand, in countries where overall vocabulary scores are substantially higher (Chile) or lower (Nicaragua), socioeconomic gradients in the proportion of children who are delayed are much lower.

The distribution of wealth in the data we use to calculate the TVIP scores is broadly similar to the distribution of wealth in nationally representative surveys for the rural areas and for the urban areas of Chile and Colombia. We can therefore also use these results to make (cautious) comparisons across rural–urban areas in these two countries and across rural areas in all countries. We are still using the data from rural areas of Peru and Ecuador to simulate the cost of inaction.

Table 4: Children with delays > 2 standard deviations in TVIP (percentages)

Wealth Quintile	Ecuador		Colombia	Chile		Peru		Nicaragua
	Rural	Urban	Total	Rural	Urban	Urban	Rural	Total
1	91.7	87.9	79.6	43.2	19.0	90.2	44.4	99.4
2	76.7	80.6	69.2	40.7	13.9	76.7	29.7	99.7
3	67.9	78.5	56.7	28.9	11.3	76.1	17.1	96.6
4	38.2	59.3	51.5	12.5	4.8	67.8	9.8	95.0
5	21.9	41.8	48.3	7.9	4.1	53.4	7.6	85.7
Total	55.9	69.0	61.7	25.6	10.6	73.0	22.2	95.9

Note: 3 to 5 years old. Source own calculations based on data from Table A.1.⁸

4. Methodology for estimation of CoI for preschool and home visits

We calculate the CoI of different interventions as the difference between the benefits and the budgetary costs of interventions.^f To estimate the benefits we rely upon benefits–costs ratios (r) estimated in Behrman et al.²⁰ The

^f We assume that the budgetary costs are the total real costs of the intervention. If in addition there are private costs (e.g., time costs for mothers, fees, transportation costs), then ceteris paribus our estimates overstate the CoI. On the other hand if the

value of r in each country was obtained assuming an i percent increase in per capita income of those affected by the intervention during their first t years in the labor market. The increase in income as a consequence of the intervention is discounted at a rate d to obtain the present value. Then, the present value of increased income is divided by the average cost of intervention. Therefore, as stated in equation (1), the benefit–cost ratio is a function of parameters involved in the simulation such as the span of time considered, the discount rate used, the projected per capita income increase that reflects the impact of the intervention, the age at which children enter the labor market and the costs incurred due to the intervention.

$$r^X = f(i, t, d, c) = \frac{\sum_{j=a}^{t+a} \frac{PCI_j^X \times i}{(1+d)^j}}{c^X} \quad (1)$$

Where PCI_j^X is the projected per capita income in the country X in the j^{th} year since the intervention, a is the age at which children affected by the program today enter the labor market^g, t is time horizon in which we measure benefits, i is the expected percentage increase in income due to the participation in the program, c^X is the average cost of the program in the country X and d is the discount rate. The higher the impact of the intervention i and the time span considered t , the higher is the expected r . On the other hand, the higher the discount rate d and the average cost c , the lower is the expected benefit–cost ratio. As r is sensitive to the value assumed for the parameters in the simulation, we use different benefit–cost ratios calculated for different sets of values of the parameters as a robustness check.

We calculate the CoI of a particular intervention in each country subtracting total costs of action from the total benefits. As r is interpreted as the economic returns generated by every dollar invested in reducing learning gaps through interventions, total benefits are calculated by multiplying $r(\cdot)$ by the total investment in the program (average cost c by the number of children in the intervention).

$$CoI = N \times c \times (r(\cdot) - 1) \quad (2)$$

We present the CoI for two interventions. We evaluate the CoI for (1) closing gaps in preschool attendance and (2) reducing gaps in receptive language between the first–fourth wealth quintiles and the fifth (richest) quintile (see Tables 3 and 4).^h To do so, we need to estimate N in equation (2), i.e. the number of children between 3 and 5 years old who would need to: (1) be enrolled in preschool in order for the preschool enrolment rate to be increased to the level of Q5 children and (2) receive home visits in order to improve language development score of the percentage of delayed children that exceeds the one in Q5.ⁱ

In reality, some children might be affected by both interventions (i.e. receive home visits and go to preschool). However, because we do not have data on the overlap between lack of access to preschool and low TVIP, it is not feasible to estimate the percentage of children that overlap. We therefore choose to be conservative and run our estimates as if children were going to enrol in one intervention or the other, but not in both simultaneously.^j We use microdata detailed in Table A.1 to calculate N according to equation (3):

$$N = \{(s_5 - s_1)n_1 + (s_5 - s_2)n_2 + (s_5 - s_3)n_3 + (s_5 - s_4)n_4\} \times N^T \quad (3)$$

Where s_w ($w=1, 2, \dots, 5$) is the preschool enrolment rate or percentage of delayed children in wealth quintile w ; n_w is the share of children between 3 and 5 years old in quintile w and N^T is the total number of 3–5 year old

budgetary costs include transfers in addition to real costs (e.g., as for conditional cash transfer programs), ceteris paribus the budgetary costs overstate the real resource costs.

^g Different ages are assumed in each country based on information from household surveys. Results indicate that on average, individuals enter the labor market at 18 years in Colombia, Peru and Ecuador, 15 years in Nicaragua and Guatemala and 20 years in Chile.

^h How many children should receive visits in order to close gaps in terms of the percentage of children with delays in receptive vocabulary is not an answer we can easily answer with data at hand. For instance, we do know average effects of home visits from the literature, but to answer this question we would need the distribution of effects which is not available.

ⁱ Since language development depends on many variables, this simulation will not necessarily close the gaps in TVIP scores. For example, the gap between the richest and poor quartiles is 0.8 standard deviations (sd) in urban Chile, 0.89 sd in rural Chile; 1.23 and 0.57 in Colombia; 0.89 and 1.21 in Ecuador; 0.95 and 0.77 in Peru and 0.77 in rural Nicaragua. However, the average impact of home visits in language development is 0.6 standard deviations. So, even though the intervention may help children not to be delayed, it does not mean that average scores will be the same across wealth quintiles.

^j There is also an implicit assumption here about no crowding out of private supply because of increased public supply.

children in the country.^k Table 5 presents the total number of children in each country who are included in the intervention under this scenario. Demographic factors such as population size and the magnitude of gaps among quintiles determine the scale of the simulated intervention in each country.

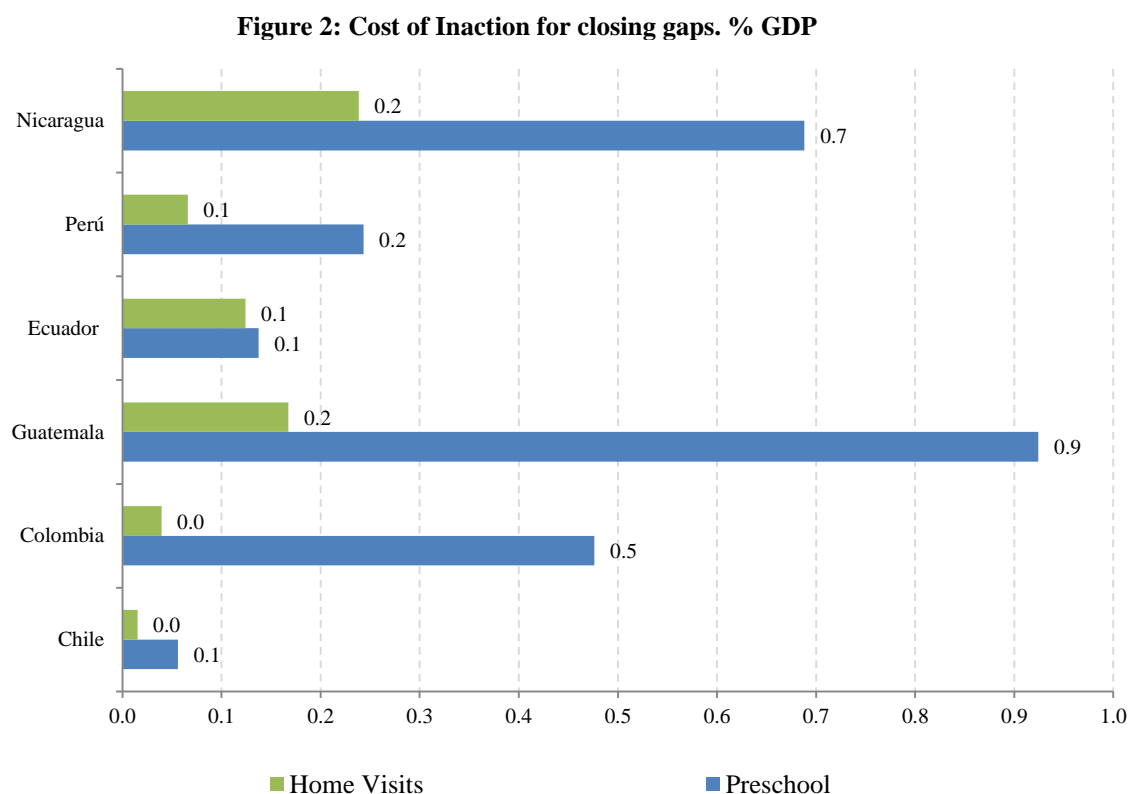
Table 5: Number of 3 to 5 years old children affected to close gaps (thousands)

	Chile	Colombia	Guatemala	Ecuador	Peru	Nicaragua
Preschool (3–5 years old)	40.2	587.1	209.6	47.9	225.3	35.1
Home visits (3–5 years old)	54.2	333.9	118.0	268.6	305.8	37.9

Note: Number of Q1, Q2, Q3, and Q4 children who should be attending preschool or be reached by home visits to close all the preschool (1st line) and language development (2nd line) gaps.

Source: Own calculations based in Schady et al (2015).⁸

Figure 2 present the CoI for closing gaps in each country. Benefit–cost ratios were calculated using the average cost of interventions (c in equation 1) presented Table A.2 in the Appendix. The program costs for different pro–grams, quality levels and countries approximate annual per–child costs for each program based on quality parameters (e.g. caregivers' schooling attainment, children/provider ratios) and local wages and prices. For the simulations be–low we assume low structural and high process qualities following the model in Behrman et al.²⁰ who use Araujo et al. inputs.²¹



The CoI for closing gaps varies across countries because of differences in the size of the targeted population for the intervention due to different preschool enrolment rates and percentage of delayed children and different populations between 3 and 5 years old (i.e. N , the number of children), the projected per capita income and differences in costs of interventions (see tables 5 and A.2). CoI also varies for each country depending on the values assumed for d . Table A.3 in the Appendix presents the same results using a higher discount rate, in both

^k For example, if the gap in stunting prevalence between Q1 and Q5 was 15% and 22% of children under two live in households in the first wealth quintile, then 3.2% of the total number of children in that age group (0-2) that receive the intervention for the stunting gap in Q1 to be reduced to 15%.

US\$ and as a % of GDP.

As can be seen in Figure 2, CoI are higher in preschool than in home visits, because gaps tend to be higher for the former intervention (with the exception of Ecuador) and benefit–cost ratios are also higher for preschool.¹ Guatemala and Nicaragua face the highest CoI: with a discount rate of 3%, the CoI for preschool are 0.9 and 0.7% of GDP, respectively. Chile, on the other hand, has a CoI of 0.1% of GDP in preschool and a very low CoI for home visits (less than 0.02% of GDP).

Alternative simulation: We analyze now a new population target in the intervention. That is, instead of closing gaps between the richest and other four wealth quintiles, we consider the CoI for (i) universal preschool coverage and (ii) home visits for all children with scores below two standard deviations from the normed mean in the TVIP. Figure 3 present the results for this simulation. In the calculations we used the same parameters as in Figure 2 regarding impacts and costs of interventions. We also present the results using different discount rates (see Table A.5 in the Appendix). CoI significantly increase in this scenario because for every country in Q5 the preschool enrolment rate is less than 100% and the percentage of delayed children is higher than zero, so it is easier to move all children to the Q5 prevalence than to the targets in Scenario 2.^m

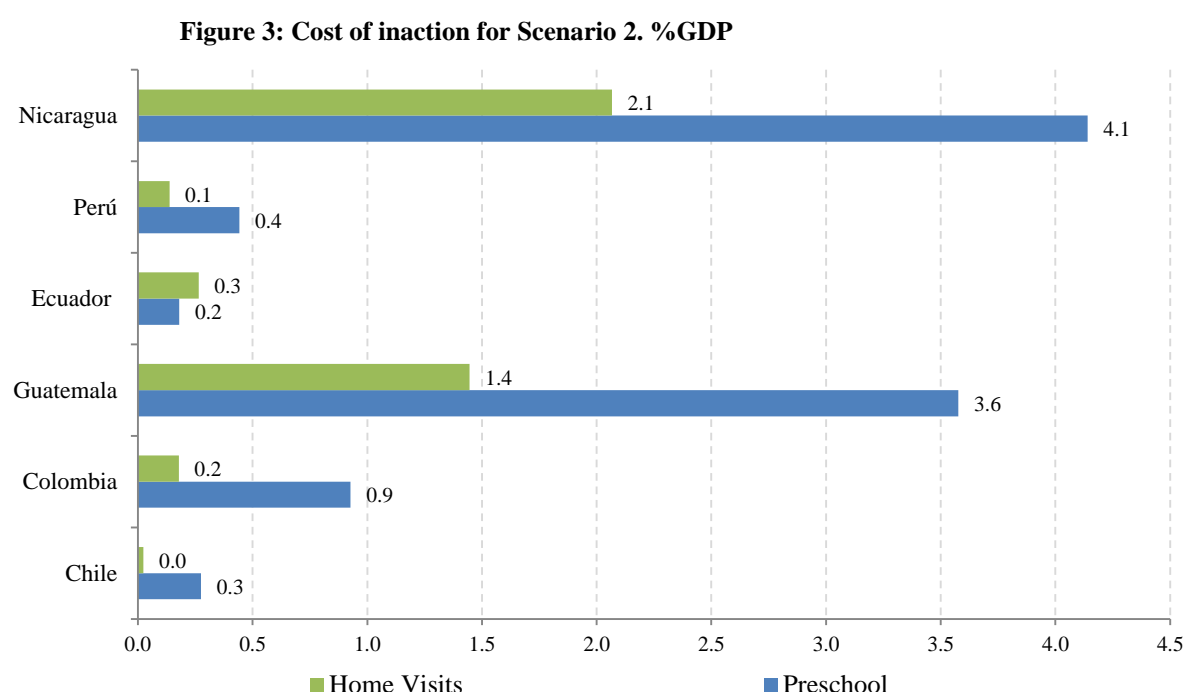


Figure 3 shows that the preschool CoI are equal to 4% of GDP in Nicaragua and 3.6% in Guatemala, using a discount rate of 3%. Again, these CoI are not low in terms of GDP or compared to the investment made by these two countries in education in 2013. In Chile, Ecuador and Peru, the CoI are <0.5% GDP because initial coverage of preschool is higher. In the case of home visits, the CoI also increases when we change the target population: for example, in Guatemala using a discount rate of 3% the CoI increases from US\$87 million for closing socioeconomic gaps to US\$723 million to bring all delayed children above the threshold score (see Tables A.3 and A.5 in the Appendix).ⁿ

To guide the interested reader in how the calculations were performed we provide a numerical example below for the case of the CoI for Nicaragua for not attaining universal preschool in the 3-5 year-old age range (using a

¹ Although home visits cost about one third of preschool services, the enrolment gaps in preschool are enough larger to offset the cheaper home visits.

^mThe number of children in the intervention for this scenario in each country is presented in Table A.4 in the Appendix.

ⁿ Benefit-cost ratios for preschool come from one single study in Argentina (Berlinksi et al.).¹⁰ However, for home visits benefit-cost ratios are sensitive to what study is being included. As a second robustness check we include Figures A.1 and A.2 in the Appendix that calculate COI in both scenarios using different benefit-cost ratios based on taking the median effect size of home visits rather than the average one.

discount rate of 3%)

Simulation	Country	N	c	GDP	r	i	COI (in millions)
Universal Preschool, d=3%	Nicaragua	0.2	735.0		4	0.12	466.09

Where N is the number of children affected by the intervention in millions (here 0.2 million children or 35.000 as indicated in Table 5), c is the cost of the intervention (here 735 US\$/child/year as indicated in Table A2), r is the BC ratio (here equals 4 as indicated in Table A2), i is the expected proportional increase in income due to the participation in the program (here 0.12).

As per re-arranging terms in equation (2) the CoI is: $N \times c \times r(\cdot) - N \times c$; or $0.2 \times 735 \times 4 - 0.2 \times 735 = 466.09$ million dollars.

By dividing this figure by the GDP of Nicaragua, we obtain the 4.1% of GDP.

5. Conclusion

We have estimated the CoI for closing gaps across wealth quintiles in preschool enrolments and in TVIP through home visits for children 3–5 years of age in six LAC countries that vary considerably in a number of dimensions, including existing program participation gaps across wealth quintiles, GDP and the benefits and costs of interventions. We use careful micro estimates of the relevant parameters for each country rather than broad averages across countries in aggregate cross-country studies (e.g., the assumed preschool enrolment-schooling attainment–wage relations in Engle et al.).⁶ Therefore we obtain estimates that are much more rooted in the realities of the countries that we consider, at the cost of covering many fewer countries than in cross-country studies using aggregate data.

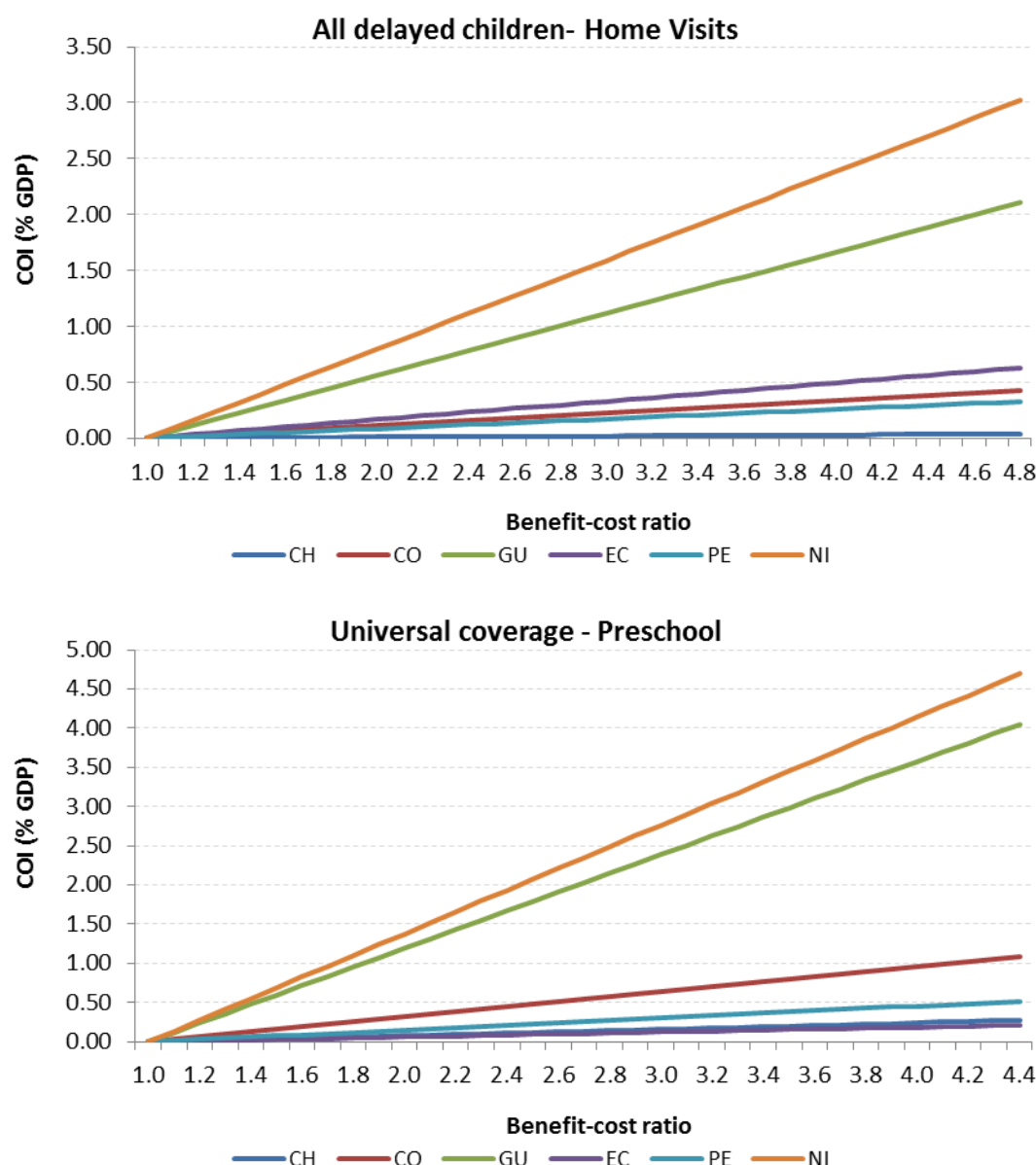
Closing gaps in the access to key goods and services such as the early child development interventions considered in this study is desired from an equality of opportunity perspective. In particular, we consider impacts on future incomes due to productivity losses in the absence of interventions. These foregone benefits are compared to intervention costs to calculate CoI. In some respects our basic estimates may be conservative because we only consider productivity effects but there may be in addition other effects such as improved health and parenting and reduced crime. On the other hand, for our estimates we assume 3% and 6% discount rates, which are low compared to the discount rates used for physical capital investments in the region (usually at least 10–12%).

We also evaluate CoI for a second scenario, where we change the target of the intervention to (i) universal preschool coverage and (ii) home visits for all children with scores below one standard deviations from the normed mean in the TVIP. As expected, CoI in this case are considerably higher in most countries, particularly in Nicaragua and Guatemala where incidence rates are higher.

Our CoI estimates are substantial, but do not imply related costs of action that are so large in general as to be inconceivable. There is considerable heterogeneity among the six LAC countries, and the related costs of action necessary to avoid the entire CoI in Guatemala and Nicaragua may be prohibitive.

As discussed above, there is considerable uncertainty about our CoI estimates. Therefore we have explored what happens if the benefit-costs ratios were smaller due, for example, to reduced benefits and increased costs of scaling-up. On the other hand, BC ratios may be greater than those used in the base simulations because of some conservative dimensions of our assumptions, such as ignoring some nonmarket benefits. Figure 4 illustrates how the CoI relates to benefit-cost ratios for the countries considered. Clearly the estimated CoI is sensitive to the assumptions underlying the benefit-cost ratios. But, at least for some countries (e.g., Nicaragua and Peru for preschool), the COI is considerable for a range of benefit-cost ratios around the ones used in the base simulations.

Figure 4: Cost of inaction (in %GDP) as a function of BC ratios, for improving child development through universal preschool and home visits for delays



In summary, the reviewed literature shows that the benefits of both interventions are always higher than costs (i.e. BC ratios are higher than 1) making them a good investment. BC ratios are about three (home visits) to four times (preschool) the resource costs (Berlinski and Schady).⁷ However, BC ratios refer to individuals and not to a society as a whole. Our CoI calculations go beyond the BC analysis and take into account the proportion of children being affected by the intervention as well as the unitary resource costs. For instance, even if preschool and home visits have similar BC ratios and are equally good investments; preschool will have a higher CoI than home visits in a country with larger gaps in preschool attendance than gaps in vocabulary scores; or in a country with higher costs per child for preschool versus home visits.

Subject to caveats because of the assumptions and limitations noted above, we conclude that both high burdens of risks for poor child development and high CoI in a number of cases mean that programmes with wide coverage to improve child development merit very serious consideration.

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Appendix

Table A.1: Surveys used in analysis

Country	Name of Survey	Years when survey was applied	Urban	Rural	Population coverage	Age range for children (in months)
Chile	Encuesta Longitudinal de la Primera Infancia	2010	4,800	594	Survey is nationally representative for households with children five years old and younger	36–57
Colombia	Encuesta Longitudinal Colombiana de la Universidad de los Andes (ELCA)	2010	1,208	1,297	Urban sample representative of all but the richest ten percent of population. Rural sample representative for four geographic subregions	36–71
Ecuador	Ecuador Longitudinal Survey of Child Health and Development (ELSCHD)	Baseline: 2003–2004. 1st followup: 2006. 2nd followup: 2008. 3rd followup: 2011	1,227	1,692	Families eligible or almost eligible for the Bono de Desarrollo Humano cash transfer program	36–71
Nicaragua	"Atención a Crisis" database	Baseline: 2005. 1st followup: 2006. 2nd followup: 2008	NA	1,817	Households representative for six rural municipalities targeted for the Atención a Crisis cash transfer program	36–71
Peru	Young Lives	Baseline: 2006–2007. 1st followup: 2009	1,038	817	Representative for all but the richest 5 percent of districts in Peru	53–71

Notes: In countries with more than one survey, the sample sizes refer to the baseline survey, as these are the results we use for the bulk of the analysis.

Table A.2: Benefit–cost ratios and average cost of action per child

Country	Preschool			Home visits		
	Average cost (US\$)	Benefit–cost ratio		Average cost (US\$)	Benefit–cost ratio	
		3%	6%		3%	6%
Chile	1,100	4.4	2.5	302	3.5	1.6
Colombia	1,035	3.9	2.2	273	2.6	1.3
Guatemala	735	4.0	2.3	273	3.6	1.4
Ecuador	935	3.9	2.2	273	2.6	1.3
Peru	753	3.9	2.2	273	2.6	1.3
Nicaragua	735	4.0	2.3	273	3.6	1.4

Source: Araujo et al.²¹ and Behrman et al.²⁰ Note: Given that there are not benefit data available from preschools in Ecuador, Peru and Nicaragua, we have extrapolated the BC ratio from Colombia to Ecuador and Peru, and the one from Guatemala to Nicaragua, given the regional similarities

Table A.3: Cost of inaction for closing gaps

Country	Preschool				Home Visits			
	% GDP		Millions US\$		% GDP		Millions US\$	
Chile	0.1	0.0	150.2	66.3	0.0	0.0	40.9	9.8
Colombia	0.5	0.2	1,762.6	729.4	0.0	0.0	145.8	27.3
Guatemala	0.9	0.4	462.2	200.3	0.2	0.0	83.7	12.9
Ecuador	0.1	0.1	129.9	53.8	0.1	0.0	117.3	22.0
Peru	0.2	0.1	492.1	203.6	0.1	0.0	133.5	25.0
Nicaragua	0.7	0.3	77.5	33.6	0.2	0.0	26.9	4.1
Discount rate	3%	6%	3%	6%	3%	6%	3%	6%

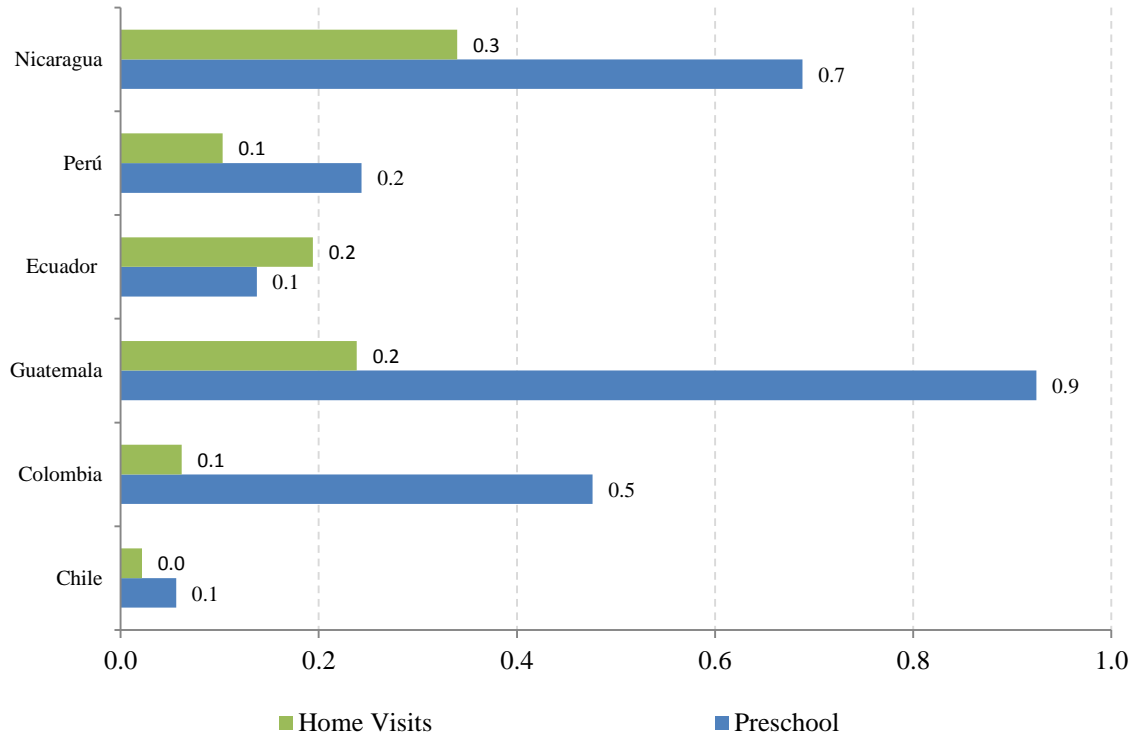
Table A.4. Number of children affected (in millions) in Scenario 2

Country	Preschool	Home visits
Chile	0.2	0.1
Colombia	1.1	1.5
Guatemala	0.8	1.0
Ecuador	0.1	0.6
Peru	0.4	0.6
Nicaragua	0.2	0.3

Table A.5. Cost of inaction for Scenario 2

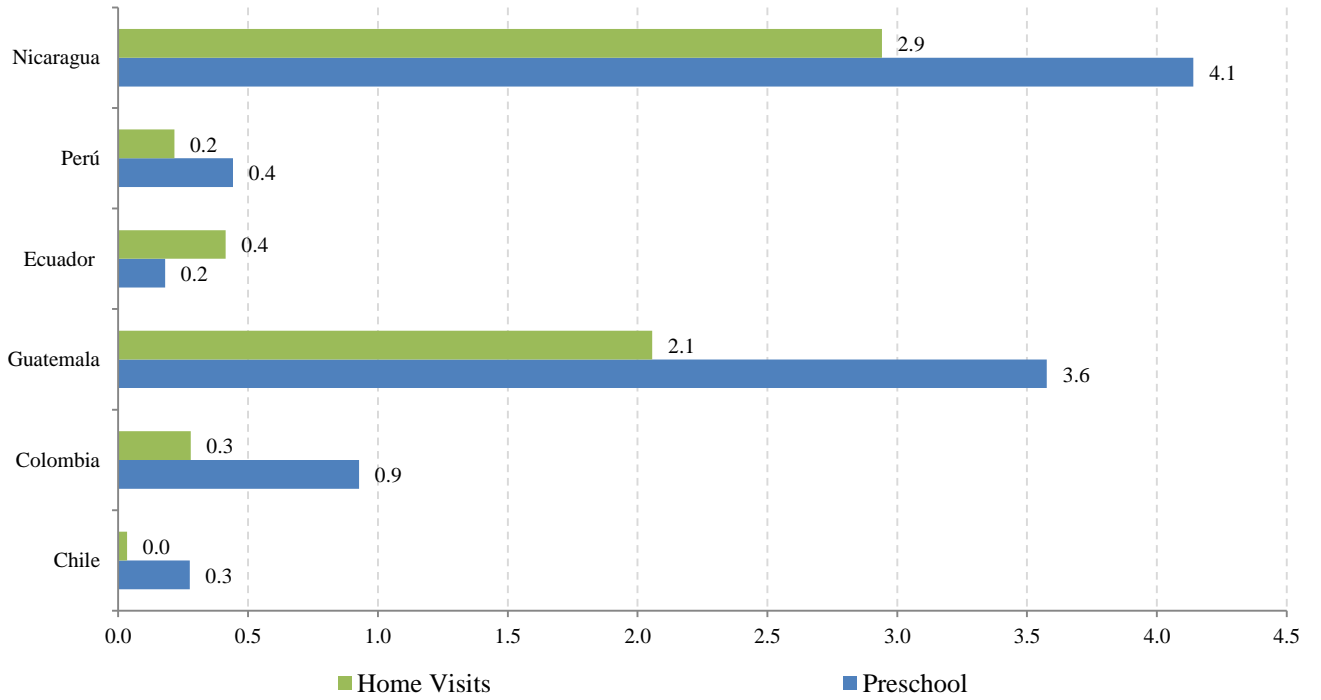
Country	Preschool				Home Visits			
	% GDP		Millions US\$		% GDP		Millions US\$	
Chile	0.3	0.1	737.4	325.3	0.0	0.0	65.1	15.6
Colombia	0.9	0.4	3,430.9	1,419.7	0.2	0.0	660.2	123.8
Guatemala	3.6	1.5	1,788.2	774.9	1.4	0.2	722.7	111.2
Ecuador	0.2	0.1	170.6	70.6	0.3	0.0	250.1	46.9
Peru	0.4	0.2	894.3	370.0	0.1	0.0	279.6	52.4
Nicaragua	4.1	1.8	466.1	202.0	2.1	0.3	232.6	35.8
Discount rate	3%	6%	3%	6%	3%	6%	3%	6%

Figure A.1: Cost of inaction for Scenario 1. %GDP



Note: Benefit–cost ratios for home visits are: Colombia, Ecuador and Peru: 3.5; Nicaragua and Guatemala 4.7 and Chile 4.5

Figure A.2: Cost of inaction for Scenario 2. %GDP



Note: Benefit–cost ratios for home visits are: Colombia, Ecuador and Peru: 3.5; Nicaragua and Guatemala 4.7 and Chile.